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International financial integration, trade and welfare gains: evidence from emerging and developing economies

Asif Saeed

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Doctor of Philosophy

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Bond Business School

Associate Professor Gulasekaran Rajaguru
Professor Ahmed Masood Khalid

Abstract

International financial integration and trade provides welfare benefits to individuals of developing economies through expansion in consumption and production opportunities. In the first part, this thesis computes welfare gains under assumed autarky conditions relative to actual levels of international financial integration. In the second part, we investigate a long-run relationship between trade variables and welfare gains. We use data from the Penn World Table 8.0 for 51 countries classified into more financially integrated economies (MFIs) and less financially integrated economies (LFIs) for the years 1961 to 2010.

This thesis examines issues related to the measurement of welfare gains from international financial integration and then investigates short-term and long-term impact of trade on welfare gains. Previous studies suggest that capital flows occur from countries with more capital to countries with relatively less capital. This leads to efficient allocation of resources in the global economy and improve the standards of living of the people across countries.

We acknowledge the lack of consensus on calculating welfare gains and inconclusive relationship between welfare gains and growth in literature. This thesis contributes in the existing literature in two distinct ways. First, we compute welfare gains by utilizing four alternative methods. These methods mainly vary in terms of incorporating the time preference rate and capital varieties which have significance in calculating welfare gains within countries over time. It is important to note that we do not assume prior values of the parameters in calculations of welfare gains. We construct country-specific time series of welfare gains under integration relative to autarky. This requires us to calculate two consumption series i.e. consumption under integration and autarky conditions. We assume actual consumption as consumption under integration and compute autarky consumption by accounting for respective macroeconomic measures (e.g. capital share, depreciation rate and total factor productivity). Second, this thesis provides important insights regarding the role of trade in explaining country level variations in welfare gains. We achieve this objective by investigating short-run and long-run relationship between trade variables and welfare gains. We examine causal effects from exports and imports to welfare gains in a multivariate vector autoregressive (VAR) framework. We find that welfare gains measured in terms of the ratio of consumption under integration relative to autarky range from 0.76 to 3.26 for MFIs and 0.43 to around 7.00 for LFIs. It implies that consumption with international financial integration in certain MFI countries is more than three times higher relative to autarky in different years between 1961-2010. Similarly, this welfare level indicates seven times higher consumption with international financial integration

relative to autarky in LFI economies. These results show a wider range of welfare gains which is unique in various ways compared to gains given in the literature. Implied welfare gains from international capital flows depend on how rapidly the domestic rate of return to capital converges to the world rate. We notice that differential in the rates of return may persist across countries for a longer period than is assumed in the optimal savings model. This continues to encourage international capital flows to most developing and emerging economies. We attempt to provide evidence based on the availability of time-varying relevant macroeconomic measures which allow us to construct a historical series of welfare gains for a large set of MFI and LFI countries.

Regarding the long-term co-movement of trade variables and welfare gains, the results suggest that latter is primarily driven by imports in both MFI and LFI economies. Overall results indicate self-fulfilling prophecies between welfare gains and trade variables for 5 out of 9 MFI economies. We find that welfare gains are import led in 4 out of 5 MFI economies which experience positive impact of imports on welfare gains. These four economies include Indonesia, Israel, South Korea and Thailand. In general, empirical evidence suggests that domestic consumers benefit more relative to producers because trade allows imports and causes domestic prices to fall in the importing country. It also supports the conventional argument that consumer gains are generally higher relative to the losses of producers in the economy. India is the only MFI case of export led welfare gains in co-integrated systems. Similar to MFI economies, the empirical evidence suggests presence of import led and export led welfare gains in LFI economies. In this group, we find export led welfare gains for Botswana considered as an African success story. In a nutshell, the results indicate that welfare gains increase due to trade (imports and export channels).

Key words: Capital flows, balanced growth, financial integration, neoclassical growth model, productivity, welfare, vector autoregression, co-integration, long-run causality, steady state.

Declaration by the Author

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Doctor of Philosophy.

This thesis represents my own original work towards this research degree and contains no material that has previously been submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made.

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ABBREVIATIONS

Akaike information criterion	AIC
Augmented Dicky-Fuller	ADF
Autoregressive	AR
Autarky consumption	CA
Central and East European Countries	CEEC
Chin-Ito Index	KAOPEN
Cointegration equation	CE
Constant relative risk averse utility function	CRRA
Emerging Asian economies	EAE
Foreign direct investment	FDI
Gourinchas and Jeanne	GJ
Gross domestic product	GDP
International Financial Statistics	IFS
International Monetary Fund	IMF
Lagrange multiplier	LM
Less financially integrated	LFI
More financially integrated	MFI
National Bureau of Economic Research	NBER
North Atlantic Free Trade Area	NAFTA
Organization for economic cooperation and development	OECD
Penn World Table	PWT
Purchasing power parity	PPP
Ramsey-Cass-Koopman	RCK
Research and Development	R & D
Phillip-Perron	PP
Schwarz Criterion	SC
Total factor productivity	TFP
Two stage least squares	2SLS
Vector autoregressive	VAR
Vector error correction model	VECM
Welfare gains	WG
World Bank	WB
World Development Indicators	WDI
World Trade Organization	WTO

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CHAPTER 1
INTRODUCTION

1.1 Introduction and motivation

Welfare gains from international financial integration and how these gains depend on the volume of trade in developing countries are compelling issues for researchers and policy makers. This thesis, first, explores issues related to the measurement of welfare gains from international capital flows in emerging and developing economies. Secondly, it investigates trade effects of financial and good markets integration on welfare gains at the country level. While relatively free international capital mobility receives greater attention in the last three decades, the question of welfare benefits from it dates back to the neoclassical growth model develped by Solow (1956). The neoclassical model predicts that capital flows from capital abundant developed countries to capital scarce developing economies and results in welfare improvements in the global economy (Mussa et al, 1998; Eichengreen, 2001). Liberalization of international capital flows in this framework contributes toeconomic growth and welfare of developing countries through incentives for savings and investment as well as better allocation and utilization of resources (Fischer, 1998; Obstfeld, 1998; Rogoff, 1999; Summers, 2000 and Henry, 2007). Efficient allocation of resources is indeed one of the main motivations behind the push towards international financial integration in developing countries to improve the standards of living of individuals. (Gourinchas and Jeanne, 2006) (GJ hereafter).

There are two main approaches for measuring welfare gains which include international risk sharing and capital accumulation. Since Lucas's (1987) contribution to measure welfare gains, many studies analyze welfare gains from international financial integration using the first approach based on international risk sharing. (Obstfeld, 1994b,c, 1995; Shiller and Athanasoulis, 1995; Tesar, 1995; Van Win coop, 1994, 1996, 1999; Athanasoulis and Van Wincoop, 2000). Welfare gains, according to this strand of literature, refer to benefits associated with reduction in consumption volatility as countries diversify country-specific risk related to domestic consumption. This international risk sharing results in welfare gains because countries borrow from international financial markets in recessions and lend to others or repay their loans in times of recovery and expansion.

The second approach is relatively more recent and focuses on measuring welfare gains of international capital flows through the reduction in the cost of capital and leads to faster capital accumulation.[1] GJ estimate welfare gains of international capital flows which result from the capital scarcity of developing economies for the first time using standard neoclassical growth framework. They define welfare gains in terms of percentage increase in the country's consumption that brings domestic welfare under conditions of autarky up to the level of welfare when a country financially integrates. Interestingly, however, they observe insignificant welfare gains in developing countries. They find that level of capital inflows which increases capital stocks of a developing economy by almost 100% can translate into a welfare gain of merely 1.7% of current consumption. The empirical evidence about the macroeconomic impact of liberalization of capital flows on economic growth is, however, mixed. A few studies observe a significant positive relationship of international capital flows on economic growth (Henry, 2003; and Bekaert et al, 2005) while others remain sceptical about any worthwhile benefits of capital account liberalization (Rodrik, 1998; Kraay, 1998; Eichengreen, 2001; and Prasad et al, 2003). Subsequent research explains that welfare gains are small due to negligible differences in marginal product of capital across countries and find only short-run effects of capital flows on growth and welfare (Caselli and Feyrer, 2007; and Prasad and Rajan, 2008).

The question about welfare gains from international financial integration continues to perplex researchers as they measure these gains using neoclassical economic theory of reallocation of resources. Hoxha et al. (2013) further drives this debate by incorporating elements of endogenous growth in neoclassical framework and compute welfare gains coming from the capital scarcity of emerging and developing economies. Surprisingly, welfare gains increase manifold in contrast to the gains calibrated by previous literature using neoclassical economic model. The calibrated results of this study show that welfare gains depend on different assumptions of growth as well as specification of parameters which are used in measuring them. The current literature computes welfare gains for emerging and developing economies by using common parameter values of the US economy which include time preference rate, capital's share in output, productivity growth, depreciation rates and population growth rates (GJ; Hoxha et al, 2013). These studies specify common long run parameters values from the US economy in calibrations to measure welfare gains and provide immediate motivational relevance for the current thesis. If, as the previous literature suggests, that there are welfare gains from international capital flows for emerging and developing

1 This approach considers that capital moves from capital abundant rich countries to capital scarce developing countries. The return to capital is higher in developing countries relative to developed economies. Based on this approach, we consider that capital accumulation is not a zero-sum game and there is net capital accumulation which generates welfare gains in developing countries.

economies, it will be an appropriate empirical exercise to investigate this issue and measure welfare gains by specifying and focusing on parameter choices which *directly* account for domestic macroeconomic conditions of these countries.

The main objective of this thesis is to measure *country-specific* welfare gains from international financial integration by incorporating *country-specific* macroeconomic parameters in contrast to parameter values from the US economy. More specifically, we construct *time series* of welfare gains by using the framework developed by GJ and extended by Hoxha et al. (2013) for a sample of 51 emerging and developing economies in the light of their respective macroeconomic conditions. Following Prasad et al. (2003), we split the sample into two groups namely more financially integrated (MFI) and less financially integrated (LFI) countries (Appendix 1A).[2] They classify countries based on actual capital flows measured as ratios of gross stocks of foreign assets and liabilities to GDP for the years 1960-1999. We use data from Penn World Table (PWT. 8). It is a data source which provides information about *time series* of country-specific macroeconomic factors such as total factor productivity, growth rates, labour shares and depreciation rates. In addition, we estimate the time preference rate for each countryand use its value in measuring welfare gains. We employ these parameters in computing consumption under autarky and measure welfare gains as ratio of consumption under integration relative to autarky. To our knowledge, no study measures welfare gains in terms of actual consumption relative to autarky using country-specific characteristics. We contribute in the literature by constructing time series of welfare gains using country-specific parameters to obtain deeper insights and intuition of their role in welfare gains of emerging and developing countries.

Implied welfare gains from international financial integration relative to autarky depend on the assumption of how an economy works in an autarkic environment. International capital flows contribute to higher household's consumption levels as capital mobility lowers domestic rate of return to that of the world rate and brings welfare benefits for individuals. GJ compute welfare gains by using standard neoclassical production function which indicates that domestic rate of return to capital in an economy becomes equal to the world rate very rapidly even when it accumulates capital under financial autarky. As a result, financial integration brings insignificant welfare gains. On the other hand, Hoxha et al. (2013) depart from this assumption of previous literature characterized by constant returns production function and consider capital

2 Kose et al. (2003) also describe this classification scheme into more financially integrated (MFI) economies and less financially integrated (LFI) economies.

varieties within a domestic economy as imperfect substitutes.[3] This assumption is critical in understanding economic intuition behind implied welfare gains as well as differences in their size. It actually guides about how an economy would operate if it were to be completely autarkic. This slows down the speed at which the domestic rate of return converges to the world rate and results in manifold increase in welfare gains in terms of permanent percentage increase in consumptionin sharp contrast to neoclassical theory. GJ find welfare gains of 1.74% of permanent percentage increase in consumption from international capital flows. Hoxha et al. (2013) show that by considering capital varieties as imperfect substitutes wouldreduce the value of substitution parameter and produce welfare gains equivalent to 5.74% of annual increase in consumption.[4] For economies with higher capital scarcity, welfare gains increase by more than 9%. This wide difference in the size of welfare gains from two theoretical perspectives raises an important question about the assumption of perfect capital subsitutablity provides space for further research to look into factors contributing in welfare gains. Both GJ and Hoxha et al. (2013) use common parameters from the US economy in welfare calculations for developing countries at a point in time with little emphasis on country-level welfare perspective. Our objective of measuring *country-specific* welfare gains by incorporating time-varying macroeconomic parameters choices could yield interesting insights and findings about welfare effects of international capital flows in emerging and developing economies.

While this study contains elements in common with previous works, (GJ; and Hoxha et al, 2013), it contributes to literature in several ways. Firstly, the previous literature employs the argument of steady state or long-run growth for measuring welfare gains which constitutes an essential feature of most growth models. These models follow Kaldor facts and Uzawa steady state growth theorem. [5] However, there are systematic and structural changes which occur in various sectors of the economy and affect macroeconomic conditions (Chenery, 1960; Kuznets, 1973; Kongsamut et al, 2001; Ngai and Pissarides, 2007). Many growth models also account

3 Capital varieties or types are considered as intermediate goods. Romer (1990) explains in his endogenous growth model that intermediate goods can be termed as capital varieties.

4 The neoclassical model assumes that capital is perfectly substitutable. In this growth framework, the value of the substitution parameter is 1 under which the value of elasticity of substitution is infinity. In such a situation, capital varieties are considered as perfect substitutes. The endogenous growth theory makes the knife edge assumption that indicates a very low level of substitution of capital varieties. However, the elements of endogenous growth, in an intermediate setting, allow a value of substitution parameter to be less than 1 and that of elasticity of substitution to be less than infinity. In such a situation, capital varieties are considered as imperfect substitutes (Hoxha et al, 2013).

5 Nicolas Kaldor establishes "Kaldor facts" in 1957. These facts relate to the growth rate of output per worker, the rate of return on capital and share of output paid to capital and considered constant over time. Uzawa (1961) proves the steady state growth theorem. The theorem states that technical change must be labor augmenting in the neoclassical growth model. In short, it explains balanced growth path or balanced growth in theory which refers to a situation in which all quantities increase at constant rates.

for these changes as well as characteristics of long-run economic growth (Matsuyama, 1992; Caselli and Coleman, 2001; Gollin, 2002; and Hall and Jones, 2007). Moreover, Acemoglu and Guerrieri (2008) demonstrate that factor proportion differences across economic sectors result in non-balanced growth without fundamentally altering its long-run features. One of the recent studies by Papell and Prodan (2014) also investigates paths of per capita GDP for a sample of 26 OECD and Asian economies for 139 years and finds that majority of economies do not strictly follow balanced growth path. Except US and Canada, majority of the economies show a distinct change either in the level of GDP per capita or its growth rate for many years. Previous literature on welfare gains and international capital flows ignore the implications ofr these systematic and structural changes which occur in economies from time to time. We consider that measuring country-specific time series of welfare gains which incorporate these changes related to domestic macroeconomic characteristics is an imporatnt contribution which will provide additional insights about welfare gains in emerging and developing economies. Our study contributes in the literature by using time-varying extracted values of country-specific factors such as capital share in output, depreciation rate and total factor productivity from PWT 8. In addition, we estimate the coefficient of previous period consumption for each country and employ it as the time preference rate in welfare calculations.

Secondly, we depart from the previous works GJ and Hoxha et al. (2013) which calculate welfare gains based on standard neoclassical and endogenous growth settings at a point in time and construct *time series* of welfare gains for the years1961-2010.[6] We conjecture that the determinants of welfare gains vary within countries over time. This is important because financial integration results in heterogeneous short run and long run effects on growth and welfare of countries due to their size, level of risk and degree of initial capital scarcity (Coeurdacier et al, 2013). In addition, PWT Version 8 introduces novel timevarying country-specific measures which can be used for economy-wide comparisons within a country (Feenstra et al, 2015). The availability of these time-varying characteristics which are used in welfare calculations also provides a motivation for the construction of the *time series* of welfare gains. We consider that differential in the rates of return to capital may persist across countries and overtime which continually encourages international capital flows to most developing and emerging economies.

6 We use data from Penn World Table (PWT) version 8.0. It provides data for the period 1950-2011. We use data from 1961-2010. We lose one observation as we have to calculate percent changes in welfare calculations. Hoxha et al. (2008) mention that 1960 is a good starting point for analyzing the theoretical predictions of neoclassical growth model using actual data. The latest version of PWT 9.0 which is available from 2017 extends the data up to the year 2014.

Thirdly, we empirically examine and investigate short-run and long-run causal effects of trade variables of exports and imports on welfare gains. This is important because policy makers in developing and emerging economies view increasing international financial integration and trade as instruments for achieving higher levels of income to improve the living standards of the people. Long-run per capita growth of income is regarded as a crucial measure of economic performance in these economies. We extend the current research and consider time-varying welfare measure may be a good indicator of long- run economic performance of developing countries. It is, therefore, a worthwhile research endeavour which aims at obtaining additional insights about the welfare effects of trade in the short-run and long-run.

1.2 Basic stylized facts: capital flows

To motivate this research, we present some stylized facts about the process of international financial integration and its associated growth and welfare gains. The size and scale of international capital flows in emerging economies increased dramatically over the last three decades. International financial integration measured as the percentage of cross-border financial claims and liabilities to gross domestic product (GDP) has almost doubled from 35% in 1980 to 70% in 2010 in emerging market economies (Lane, 2013).[7] These capital flows have potential welfare implications and induce policy makers in emerging and developing countries to introduce policies of capital account liberalization which result in improving standards of living of the people.[8] In the following section, we explain the stylized facts as well as measures of international financial integration to further motivate this research.

1.2.1 Measures of financial integration

The process of international financial integration starts with liberalization of capital account.[9] The evolution of the process shows that there are two measures of financial integration. The first measure builds on capital account restrictions placed officially by governments of countries and reported to International Monetary Fund (IMF). The second measure considers estimated gross stocks of foreign assets and liabilities which are calculated as percentage of GDP. The former shows *de jure* restrictions on the capital account and latter measure is *de facto* which highlights yearly movement of capital flows. It reflects the extent of integration of capital markets across different countries. The distinction between *de jure* and *de facto*

7 International financial integration in terms of percentage of cross-border financial claims and liabilities to gross domestic product (GDP) reaches the peak level close to 74% in 2007 before plunging to 55% in 2008 during the global financial crisis and recovering again in the following year in 2009. Moreover, this ratio does not include countries with total GDP less than 10 billion dollars (Lane, 2013).

8 Most countries liberalize their capital account regime in the 1980s (Prasad et al, 2003; Henry 2003; and Kose et al, 2009).

9 The discussion of this part of the section is based on Prasad et al. (2003).

measures of financial integration is important because it provides roots to the debate on the benefits and costs of financial integration in emerging and developing economies. Some paradoxical phenomenon shows the significance of these two measures. For example, many developing economies in Latin America experience *de facto* integration as reported by capital flights in the 1970's and 1980's despite official capital account restrictions while others experience negligible capital inflows despite very few restrictions on the capital account.[10] We consider both measures of financial integration for the sample of countries included in this study to explain the stylized facts.

1.2.2 Gross stocks of foreign assets and liabilities as share of GDP: A *de facto* measure

We use updated and extended External Wealth of Nations database (1970-2011) developed by Lane and Milesi-Ferretti (2011) in order to show trends of financial integration in emerging and developing economies. Prasad et al. (2003) use an earlier version of this data developed by Lane and Milesi-Ferretti (2004) to show similar patterns of financial integration for industrial and developing countries till 1999. The idea of welfare gains from international capital flows which focusses on capital scarcity using a neoclassical economic model was still in its infancy at that time.[11] We use the extended data set as the debate about the welfare gains coming from capital scarcity of developing countries evolves over the decade.[12] Figure 1 shows the trends of international financial integration for MFIs and LFIs as measured by *de facto* measure based on actual capital flows.[13]

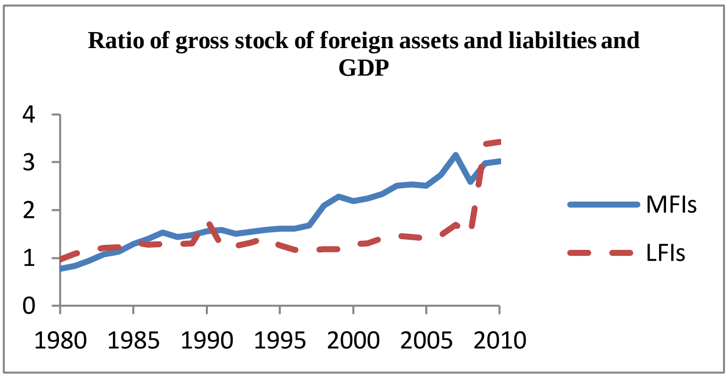
10 Prasad et al. (2003) discuss the two measures of financial integration and this paradoxical phenomenon in detail.

11 The preliminary versions of Gourinchas and Jeanne work on the benefits of capital account liberalization for emerging economies came out in 2002 followed by its publication in the form of NBER working paper series in 2003.

12 Gourinchas and Jeanne paper was published in final form in 2006 while Hoxha et al. (2013) preliminary versions came out in 2008.

13 Figure 1 in this section of stylized facts uses data from 1980-2010. For the de facto measure, the data is available is up to 2011. As the study uses data up to 2010 for calibrations of welfare results, we show trends up to 2010. We take 1980 as the starting point because most studies cite 1980s as the period when most of the economies undergo capital account liberalization (Henry, 2007).

Figure 1: Financial integration in MFIs and LFIs: A *de facto* measure (1980-2010)



Source: Calculations based on External Wealth of Nations Mark II database (2011)

It indicates that the ratio of gross stocks of foreign assets and liabilities to GDP is growing for MFIs for most of the period from 1985-2007 as compared to LFIs. Foreign assets and liabilities include portfolio equity, foreign direct investment, debt equity and financial derivatives. This ratio in MFI economies suffers a decline in 2007 before recovering again in the year 2000.[14] In addition, capital flows to some LFIs such as Mauritius increase manifold. It rises from 1,867 million of US dollars in 2001 to $ 449,605 million of US dollars in 2011.[15] These trends increase the ratio of gross stocks of foreign assets and liabilities to GDP in LFI economies for a couple of years during the global financial meltdown in 2007-2009.

To further motivate the discussion, we present actual mean ratios for selective MFIs and LFIs economies for the period 1980-2010. Table 1 below shows the top five countries from each of the two groups with higher average value of foreign assets and liabilities as a share of GDP. It highlights marked variation in this measure within MFIs and LFIs. Hong Kong with the value of more than 12 is at the top followed by Singapore. Hong Kong and Singapore are considered relatively more financially open economies from the outset with minimum capital controls on cross border transactions as compared to other Asian economies (Kawai et al, 2012). On the other hand, remaining three countries Malaysia, Israel and Chile have mean value of less than 2 in terms of gross stocks of foreign assets and liabilities to GDP. In the LFIs category, Mauritius and Panama attract more capital flows than other economies.

14 One reason for the fall in this ratio gross stock of foreign assets and liabilities for MFIs in 2008 may be global financial crisis of 2008 (Lane, 2013).

15 We obtain these figures from External Wealth of Nations Mark II database (2011). We also discuss about patterns of financial integration in Mauritius in our discussion on time series of welfare gains in LFIs in Chapter 4.

Table 1: Top five MFIs and LFIs in terms of ranking based on *de facto* measure of financial integration: (1980-2010)

No	MFIs	Value	LFIs	Value
1	Hong Kong, SAR China	12.827	Mauritius	7.418
2	Singapore	9.042	Panama	5.738
3	Malaysia	1.600	Nicaragua	2.831
4	Israel	1.547	Togo	1.856
5	Chile	1.503	Jamaica	1.722

Source: Calculations based on External Wealth of Nations Mark II database (2011)
These values are ratios of gross stock of foreign assets and liabilities to GDP

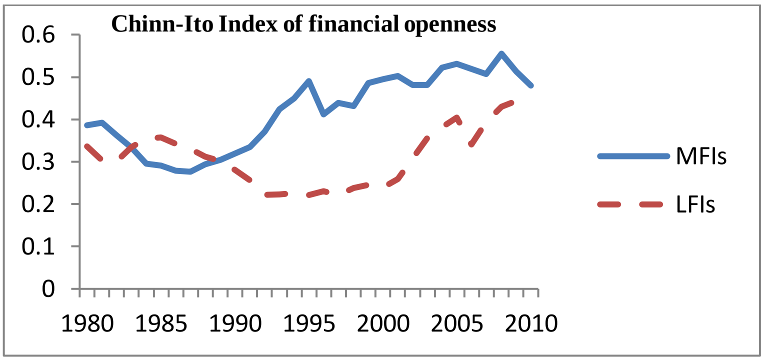
An interesting feature of this discussion highlights that all LFI economies mentioned in Table 1 have a higher average ratio than Malaysia, Israel and Chile which fall in the MFI group according to the classification of Prasad et al. (2003). It underscores the need to revisit the role of international capital flows and their welfare implications in the light of *country-specific* characteristics of developing countries.

1.2.3. Country's degree of capital account openness: A *de jure* measure

Prasad et al. (2003) employ *de jure* measure based on official restrictions of capital flows reported to IMF by the respective governments of countries. They also highlight the limitation of this binary restrictive measure because it does not properly account for differences in capital controls across countries. In the current study, we motivate our discussion by using a new *de jure* measure of financial openness known as Chinn-Ito index (KAOPEN). Chinn and Ito (2008) developed this index which measures a country's degree of capital account openness and normalize it between the range of 0 and 1.[16] Figure 2 shows the trend of capital account liberalization for MFIs and LFIs for the period 1980-2010.[17] It indicates that MFIs are comparatively more financially open than LFIs, despite increasing degree of financial openness in LFIs over the last decade. Higher value of the index indicates higher degree of financial openness. This is also consistent with overall trends observed by Chinn-Ito (2008) in which emerging economies perform better than less developed countries.[18] However, we observe that this ratio which remains flat in the 1990's begins to improve since 2000 for LFIs indicating higher degree of financial openness.

16. Chinn and Ito (2006) measure (KAOPEN) is based on principle component analysis of three financial binary indicators (multiple exchange rates, current account, and surrender of export proceeds) and a 5-year average of IMF_BINARY.
17. This data is available up to 2013. As the study uses data up to 2010 for calibrations of welfare results, we report the trends up to 2010.
18 The trends of Chinn-Ito index are updated every year. For this study, we report trends up to 2010 as we measure welfare gains up to this period.

Figure 2: Financial openness in MFIs and LFIs: A *de jure* measure (1980-2010)



Source: Based on Data collected from Chinn – Ito Financial Openness Index (2013)

Table 2 presents the mean value of financial openness index of top five MFIs and LFIs for the period 1980-2010. Hong Kong is at the top in terms of *de jure* measure of financial openness similar to *de facto* measure followed by Singapore. This may illustrate that countries' enjoying higher degree of financial openness also attract higher capital flows. On the contrary, Panama enjoys the same position in terms of *de jure* measure as that of Hong Kong but it falls in the category of LFIs. As mentioned earlier, some systematic and structural changes occur across economies from time to time which may influence patterns of both capital flows and welfare effects associated with them.[19] It also calls for further research to examine the contribution of international capital flows with *country-specific* characteristics to measure and analyze welfare gains in developing and emerging economies.

Table 2: Top five MFIs and LFIs in terms of ranking based on *de jure* measure of financial openness: (1980-2010)

No	MFIs	Value of index	LFIs	Value of index
1	Hong Kong SAR, China	1.000	Panama	1.000
2	Singapore	0.978	Uruguay	0.826
3	Indonesia	0.848	Haiti	0.619
4	Malaysia	0.689	Guatemala	0.604
5	Peru	0.666	Jamaica	0.565

Source: Calculations based Chinn-Ito index (*KAOPEN*) updated till 2013.

1.2.4 North South capital flows

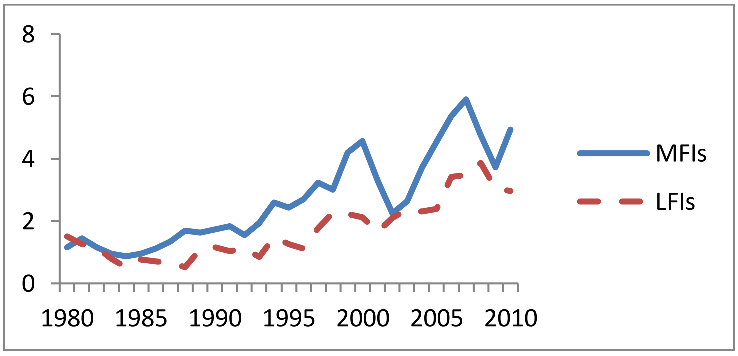
North South capital flows also constitute an important feature of the debate on international financial integration. This debate revolves around the movement of capital flows from advanced industrial countries (the North) to less developed economies (the South). Prasad et al. (2003) classify three main categories of this type which include foreign direct investment

19 It may also affect other macroeconomic fundamentals. This thesis, however, focuses on the impact on welfare gains.

(FDI), portfolio, and bank lending. They observe that capital flows consisting of FDI and portfolio grow relatively more in significance as compared to bank lending which shows declining trend for the period 1970-2000. Furthermore, they find that MFIs receive relatively higher FDI and portfolio flows from advanced countries than LFIs which are mostly dependent on bank lending such as loans and grants. Jeanne et al. (2012) also suggest that the relative variability for FDI inflows is smaller than portfolio equity and bank flows.

Given that, FDI inflows constitute a major component of North-South capital flows, we plot FDI net inflows as percentage of GDP for MFIs and LFIs for the period 1980-2010 in Figure 3. It reveals interesting insights because FDI net inflows for MFIs remain relatively stable during the financial crisis experienced by countries in Asia and Latin America in 1997-1999. However, FDI inflows drop twice in the last decade first during the period 2000-2002 and then in 2007-2009. One possible reason for the fall in FDI inflows is the contraction of global economy during these years. While growth in global economy slows down from 4.3% in 2000 to 1.9% in 2001, it experiences a deep plunge during the global financial meltdown of 2008-2009. Global GDP growth rate was, in fact, negative 1.7% in 2009 before it recovers in 2010.[20]

Figure 3: FDI net inflows as percentage of GDP



Source: Based on data collected from World Development Indicators (1980-2010)

Table 3 below presents top five countries belonging to two groups of MFIs and LFIs in terms of highest average FDI inflows as percentage of GDP for the period 1980-2010. For the MFIs, Hong Kong is again at the top followed by Singapore while Panama attracts the largest FDI inflows followed by Bolivia in LFIs category.[21]

20 These figures are obtained from the World Bank https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

21 We obtain data on net FDI inflows from WDI. This data source does not provide data for Hong Kong for all the years as it ceases to be a British colony and becomes a Special Administrative Region of China in 1997. We consider FDI net inflows for Hong Kong for the period 1998-2010.

Table 3: Top five MFIs and LFIs in terms of ranking based on FDI net inflows as percentage of GDP: (1980-2010)

No	MFIs	Value	LFIs	Value
1	Hong Kong SAR, China	21.176	Panama	4.267
2	Singapore	12.531	Bolivia	3.249
3	Chile	4.418	Jamaica	3.225
4	Malaysia	3.992	Botswana	3.189
5	China	3.005	Nigeria	3.159

Source: Calculations based on data from World Development Indicators (WDI)

Prasad et al. (2003) observe that MFIs are the major recipients of net FDI flows as policy makers liberalize stock markets and privatize state owned enterprises to attract foreign investment. Moreover, these types of capital flows are considered relatively less volatile as compared to other forms of capital flows because of long-term commitment. The role of FDI inflows in potential welfare gains is important because it also affects productivity through transfer of technology (Lipsey, 2004 and Moran et al, 2005). It is, therefore, important to consider associated benefits of international capital flows such as productivity growth to measure welfare gains by focusing on *country-specific* macroeconomic factors in emerging and developing economies. It will also be instructive to examine patterns of international financial integration and comparative volatility of different types of capital flows to emerging-markets by region for the period 1970-2010. [22]

We adopt Table 4 from Jeanne et al. (2012) to illustrate this point which provides average values of net flows in terms of millions of dollars from 1970-2010. It explains the behavior of different types of capital flows to developing and emerging market economies by region for the period 1970-2010. The main message that emerges from Table 4 is that share of FDI in average net flows is not only the highest for all regions, it is also the least volatile component of capital flows. This is clearly evident from the last column of Table 4 which shows relative variability of different types of capital flows.[23]

22 Data for the entire period 1961-2010 is not available. External Wealth of Nations database (1970-2011) developed by Lane and Milesi-Ferretti is also available from 1970.

23 Jeanne et al (2012) obtain relative variability figure in Table 4 by dividing share in standard deviation in column 4 by the share in average absolute value of net flows in column 6

Table 4: Comparative volatility of different types of flows to emerging- market economies, by region, 1970-2010

Flow	Computed standard Deviation (Deviation from trend)	Average net flows (millions of US dollar)	Average absolute value of net flows (millions of US dollar)	Share in standard deviation	Share in average net flows	Share in average absolute value of net flows	Relative volatility
Latin America and Caribbean							
Total flows	1.50	27,525	32,812	1.00	1.00	1.00	1.00
FDI	0.33	26,139	26,171	0.22	0.95	0.80	0.27
Equity flows	0.24	3,309	5,669	0.16	0.12	0.17	0.91
Bank Flows	0.62	381	5,338	0.42	0.01	0.16	2.56
Other flows	0.97	-2,062	14,436	0.65	-0.07	0.44	1.47
East Asia							
Total flows	2.37	35,452	38,541	1.00	1.00	1.00	1.00
FDI	0.54	38,223	38,223	0.23	1.08	0.99	0.23
Equity flows	0.20	4,541	5,847	0.09	0.13	0.15	0.56
Bank Flows	1.24	234	10,403	0.53	0.01	0.27	1.95
Other flows	2.15	-4,207	20,461	0.91	-0.12	0.53	1.71
South Asia							
Total flows	0.55	15,634	15,634	1.00	1.00	1.00	1.00
FDI	0.10	4,135	4,136	0.18	0.26	0.26	0.70
Equity flows	0.39	4,694	5,725	0.70	0.30	0.37	1.92
Bank Flows	0.20	1,353	1,871	0.36	0.09	0.12	3.02
Other flows	0.37	6,104	6,830	0.66	0.39	0.44	1.51
Sub-Saharan Africa							
Total flows	2.88	2,406	6,664	1.00	1.00	1.00	1.00
FDI	1.08	5,489	5,522	0.38	2.28	0.83	0.45
Equity flows	1.14	561	2,146	0.40	0.23	0.32	1.23
Bank Flows	0.96	-295	1,749	0.34	-0.12	0.26	1.28
Other flows	2.25	-3,349	5,626	0.78	-1.39	0.84	0.93
Europe and Central Asia							
Total flows	1.97	17,276	22,906	1.00	1.00	1.00	1.00
FDI	0.28	14,858	14,858	0.14	0.86	0.65	0.22
Equity flows	0.15	1,517	2,584	0.08	0.09	0.11	0.67
Bank Flows	1.00	4,185	10,024	0.51	0.24	0.44	1.16
Other flows	1.28	-1,562	9,926	0.65	-0.09	0.43	1.50
All regions (including Middle East and North Africa)							
Total flows	1.69	96,031	96,574	1.00	1.00	1.00	1.00
FDI	0.29	86,524	86,540	0.17	0.90	0.90	0.19
Equity flows	0.17	11,481	16,168	0.10	0.12	0.17	0.62
Bank Flows	0.74	6,049	16,587	0.44	0.06	0.17	2.56
Other flows	1.12	-8,023	37,153	0.66	-0.08	0.38	1.72

Note: These patterns of international financial integration are obtained and adopted from Jeanne et al (2012). Net outflows (the negative of net inflows) are defined as assets + liabilities (where the IMF has omitted the terms indicating changes in assets and liabilities for convenience). Bank flows are taken from subcategory 'Other investment" which is a subgroup of the financial account. Other flows are defined as non-resident financial account not included elsewhere less non-resident FDI, non-resident portfolio equity, non-resident banks. Other flows include debt, derivatives, deposits, loans, and trade credits. Jean et al (2012) obtain data from IMF, International Financial Statistics Database, July 2011.

In addition, it indicates that countries in East Asia and Latin America and Caribbean are the largest recipients of average net flows. The discussion of the stylized facts based on two measures of international financial integration also suggests that majority of MFI and LFI economies classified by Prasad et al. (2003) also belong to these two regions. These stylized facts motivate the current study to focus on the growth and welfare impact of international financial integration based on country-specific characteristics and conditions.

1.3 Welfare gains from international capital flows

To further motivate this research, we summarize key facts about the size of welfare gains from international capital flows. As mentioned in the introduction, two main approaches used to measure welfare gains areinternational risk sharing and capital accumulation. Since Lucas's (1987) contribution to measuring welfare effects, there is an extensive literature that follows his approach to estimate welfare gains from international financial integration in terms of risk sharing across countries (Table 5). This strand of literature focuses on potential welfare gains from international risk sharing under two situations. In situation 1, domestic consumption equals domestic output with no risk attached to it. In situation 2, perfect risk sharing in consumption occurs as countries' share risk associated with volatility of domestic consumption. Welfare gains result when countries' move from situation 1 to situation 2 associated with reduction in volatility of risk. Van Wincoop (1994) defines it as the permanent relative increase in the expected level of consumption that produces an equivalent improvement in welfare under international risk sharing.

The second strand of literature estimates welfare gains of international financial integration coming from the capital scarcity of developing economies. Using standard neoclassical growth framework, it focuses on how rapidly financial integration relative to autarky brings down domestic rate of return to capital to the world rate to generate implied welfare gains. GJ define these welfare gains which appear in the form of country's increase in consumption that brings welfare under autarky up to the level of welfare under integration.

1.3.1 Welfare gains from international risk sharing

We describe the welfare gains from the first strand of literature in Table 5 extracted from Prasad et al. (2003). It summarizes welfare gains in advanced countries, MFI and LFI economies. We observe from the review Table 5 that welfare gains are large from risk sharing especially for MFIs and LFIs which constitute groups of emerging and developing economies. In particular, Obstfeld (1995) finds that welfare gains measured in terms of permanent percentage increase in the level of consumption that brings an associated equivalent improvement in welfare range from 0.54% to 5.31% for developing countries.

Table 5: Welfare gains from international risk sharing

Study	Size of the welfare gains
Advanced countries	
Lucas (1987)	Small
Cole and Obstfeld (1991)	Small
Backus, Keohe, and Kydland (1992)	Small
Mendoza (1995)	Small
Tsar (1995)	Small
Kim, Kim and Levin (2003)	Small
Obstfeld (1994c)	Large
Van Wincoop (1994,1996, and 1999)	Large
Shiller and Athanasoulis (1995)	Large
Lewis (1996)	Large
Auffret (2001)	Large
Pallage and Robe (2003b)	Large
Epaulard and Pommeret (2003)	Large
Kim and Kim (2003)	Large
Advanced, MFI and LFI Economies	
Obstfeld (1994b, 1995)	Large
Schiller and Athanasoulis (1995)	Large
De Ferranti and others (2000)	Large
Athanasoulis and van Wincoop (2000)	Large
Pallage and Robe (2003a)	Large

Note: We adopt this table from Prasad et al. (2003). "Small" refers to studies that report welfare gains of 0.5 percent or less and "large" refers to studies that report welfare gains larger than 0.5% of permanent relative increase in the expected level of consumption that produces an equivalent improvement in welfare.

Athanasoulis and Van Wincoop (1997) report welfare gains in excess of 6% of expected increase in consumption for a sample of 49 developed and developing economies. Following Van Wincoop (1999), Prasad et al. (2003) compute welfare gains for advanced economies as well as MFIs and LFIs economies. They find large welfare gains for LFIs are in excess of 6%, followed by MFIs which experience welfare gains of less than 3%, and advanced economies enjoy welfare gains of less than 1% of permanent increase in the expected level of consumption. Pallage and Robe (2003a) observe large welfare effects for developing economies especially in Africa. They explain welfare gains depend on choice of parameters specified in theoretical frameworks and consumption smoothing which occurs through sharing of risk generates welfare effects as large as 10% of expected increase in consumption for less developed African economies. This strand of literature presents an overview of welfare benefits in terms of risk sharing and provides motivational relevance for the second strand of literature which computes welfare gains coming from capital scarcity of developing countries based on the calibration of neoclassical growth models.

1.3.2 Welfare gains using neo-classical growth framework

We adopt Table 6 from Gourinchas and Jeanne (2003) who report welfare gains from international financial integration for the year 1995 expressed as a permanent increase in domestic consumption of the economy. This study provides benchmark estimates of welfare effects of integration for a sample of 82 non-OECD countries using a neoclassical economic model. They further classify this sample of 82 economies using World Bank income classification approach into various sub-groups which comprise countries from low income, low middle income, upper middle income and high income (non-OECD) group. They also form regional groups of African, Asian and Latin American countries.

Overall, they find average welfare gains of 1.24% of permanent increase in consumption for the whole sample. It is also clear from Table 6 that there exists welfare gains as high as 8% of autarky consumption for individual economies such as Mozambique despite lower average size of 1.24% for the sample as a whole. African countries show higher average welfare gains of 1.65 % of permanent increase in domestic consumption. For the Asian economies, international financial integration brings welfare improvements equivalent to 1.27% of permanent increase in domestic consumption. Gourinchas and Jeanne (2003) do not find worthwhile welfare gains for Latin American economies. In this region, welfare improvements are equivalent to less than 1% of permanent increase in domestic consumption. Table 6 also reports welfare gains by excluding China and India as well as separately for these two countries.[24] The size of welfare gains remains small with this modification of sample. These gains are equivalent to less than 1.1% for a sample of 80 economies excluding China and India and 1.4% permanent increase in domestic consumption for these two countries.

One main reason for these small welfare gains in the standard neoclassical setting is that the distortion induced by liberalization of capital flows produces temporary effects and country in question converges to the steady state irrespective of international capital mobility. It implies that the difference in the discounted value of utility along transition paths under conditions of financial integration relative to autarky is very small leading capital scarce economies to accumulate capital in the long-run even without financial integration. On the other hand,

24 Welfare gains in this study are based on population weighted averages of capital ratios which are defined as the ratios of observed capital stocks to the steady state level of capital stocks. Since China and India constitute more than 50% of the population, Gourinchas and Jeanne (2003) perform welfare calculations by excluding China and India as well as separately for these two countries.

welfare gains increase by more than five times when elements of endogenous growth are incorporated in standard neoclassical setting (Hoxha et al, 2013).[25] This variation in the size of welfare gains is also observed in the risk sharing literature which reports the range of welfare gains from less than 1% of permanent increase in the expected level of consumption to 10% (Kose, et al 2003).

Table 6: The benefits of international financial integration

	Mean	Min	Max	St. dev.	Observations
Non-OECD countries	1.24	0	8.03	0.87	82
Low income	1.71	0.01	8.03	0.92	38
Lower middle income	0.98	0	2.99	0.54	25
Upper middle income	0.23	0.09	2.10	0.28	14
High income non-OECD	0.05	0.01	0.32	0.09	5
Africa	1.65	0.01	8.03	1.60	44
Asia	1.27	0	1.81	0.51	16
Latin America	0.40	0.09	1.95	0.51	22
Except China and India	1.06	0.00	8.03	1.19	80
China and India	1.39	0.08	1.79	0.50	2

Note: We adopt this Table from Gourinchas and Jeanne (2003). It is also adopted in Prasad et al. (2003) in a modified form. It reports the permanent percentage increase in consumption that yields the same level of welfare gains as switching from financial autarky to financial openness.

Coeurdacier et al. (2013) recently attempt to integrate these two approaches of neoclassical growth and risk diversification and find welfare gains not exceeding 2% of increase in permanent consumption. This study, however, highlights that welfare effects of financial integration are quite heterogeneous and vary across countries over time. In addition, country economic characteristics, size and risk conditions also play a role in measuring welfare gains. We are also motivated by these previous works and measure welfare gains by incorporating time-varying country based characteristics within countries over time.

We aim to use the *time series* of welfare gains measured in terms of actual consumption relative to autarky to analyze the casual link between trade and welfare gains. While issue of welfare benefits from international capital flows dates back to the emergence of neoclassical economic model pioneered by Solow (1956), the question of gains from international trade is even older and continues to obsess researchers since it was first raised by Adam Smith more than 200 years ago in 1776. Later on, it was emphasized by Paul Samuelson in 1939 that for a

25 In neo-classical model, capital is perfectly substitutable while endogenous growth literature considers that substitution among capital varieties is very low.

small country free trade is better than no trade. The key findings summarized from related literature on the gains from international trade provide additional motivation to the current research which are briefly discussed in the next section.

1.4 Gains from international trade

The idea that trade contributes in economic and welfare gains constitutes a central tenet of international economics and trade liberalization strategies. We also motivate our research with crucial conventional arguments about the gains from trade. Many earlier studies lay emphasis on the significance of free trade and consider it beneficial for an individual country than no trade at all (Sameulson, 1962; Kemp, 1962; Kemp and Ohyama, 1978). Grossman (1984) reinforces this argument and suggests that there are gains for small economies even from trade in goods comprising primary factors of production. However, it appears that despite the evolution of the idea from Smith to Samuelson that that trade is an important instrument for growth and welfare of nations policy makers in most countries do not incorporate elements of free trade in economic policies for long periods of time in the 20th century. Instead, they prefer protectionist policies based on the thinking of Prebisch (1950) and Singer (1950).[26]

A new strand of literature begins to reshape policy views in most developing countries when protectionist thinking failed to produce better outcomes for the people. This literature evaluates the effects of free trade and identifies various forms of gains generated by it.[27] Gains from trade are distinguished into static and dynamic gains. Static gains bring welfare for consumers from higher quality and variety of products which results in the expansion of consumer baskets (Feenstra, 1994; Romer, 1994). On the other hand, conceptual thinking based on the principles of new growth theory suggests dynamic gains as entrepreneurs and inventors benefit from increase in the size and integration of markets (Rivera-Batiz and Romer, 1990). The benefits of research and development (R & D) are not just confined to these innovation economies. These gains are also realized in developing countries which import intermediate and capital goods embodying new technology through “international R & D spillovers” (Coe and Helpman, 1995; Keller, 1998; and Eaton and Kortum, 2001). In addition, there exists mechanisms which generate gains ranging from realizing the benefits of economies of scale to reallocation of market shares to the most cost effective firms (Harrison, 1996 and Melitz, 2003).

26 This thinking is based on the argument that developing countries’ trade is concentrated in raw materials and primary commodities. Free trade across economies contributes in the reduction of international prices of these goods and services and widen income gaps across different sections of the society instead of generating gains.
27 Harrison and Rodrigues-Clare (2009) review a large body of literature to identify mechanisms of gains from trade.

These mechanisms are employed to measure welfare gains which also reflect wide differences in magnitude. Earlier empirical evidence suggests that trade liberalization increases income from 0.1% to 8.6% across various countries (Harris and Cox, 1984 and Deardorff and Stern, 1986). While the range of gains from trade is substantial, the cost of dispensing with trade completely and moving to an autarkic environment is also significant. Countries can lose up to 0.2% to 10.3% of income if they move to autarky and adopt protectionist policies (Eaton and Kortum, 2002). Arkolakis et al. (2012) recently establish certain conditions for measuring gains from trade which include relative import share of a nation and elasticity of imports with respect to trade costs. In their framework, free international trade generates gains equivalent to 3% of change in real income for a nation with the import share of 15% and elasticity value of -5.

The previous discussion evaluates mechanisms used to measure gains from trade across countries at a point in time. We construct a welfare measure based on country based characteristics within countries over time. We are interested in using the time series of welfare gains to investigate the short-run and long-run relationship of trade channels of exports and imports with this measure. This is important because policy makers of developing countries adopt policies in recent years that emphasize both free capital mobility and free trade in goods and services to enhance economic welfare and improve the living standards of the individuals. Moreover, some recent studies emphasize that integration of both financial markets and goods markets are important to reap welfare benefits from financial globalization (Ford and Horioka, 2017). This results in net transfer of capital to developing countries which benefit from capital mobility as it moves from countries where return is low to countries with relatively higher returns (Horioka and Ford, 2018).

The emphasis of the policy making world in developing countries for attracting international capital flows and promoting trade over the last three decades is supported by the dynamics of financial and trade integration. Our discussion about the stylized facts indicates that international capital flows to developing countries constitute a sizeable portion of resources being utilized in the process of economic growth and welfare. On the other hand, the share of developing countries in world exports increases by almost two times from 1985-2015. This share comprises 20% in 1985. It stands at 39% of the world exports in 2015 (Pavnick, 2017). Overall, developing countries now account for 40% of the world trade (WTO, 2016).

Moreover, despite a few crises in some countries and regions, the process of financial globalization and trade openness continues unabated. In addition, analytical approaches which estimate benefits of international capital flows by using a neoclassical economic model and elements of endogenous growth in itreflect widening gap about the size of welfare gains in emerging and developing economies. These approaches further enrich the debate about welfare gains of international financial integration, but instead of moving towards consensus, raise new questions for researchers to investigate this key issue of the global economy.[28] The question of how big or small are welfare implications of financial integration in developing and emerging economies remains pertinent and continues to receive attention of researchers to date. . This study further derives its motivation from this lack of consensus in existing literature and continued relevance of this key economic policy issue. We construct *time series* of welfare gains in an endeavour to contribute to this debate and explain more about this issue of economic theory. We use this welfare measure to evaluate the short-run and long-run effects of trade on welfare gains. Our contribution is, therefore, twofold: first we compute and construct *country-specific* time series of welfare gains from international financial integration within economies over time and second, we consider welfare gains one of the crucial measures of economic performance in developing countries and empirically investigate the causal relationship between trade and welfare gains. We depart from previous works and contribute in the literature by measuring welfare gains using country based macroeconomic characteristics to seek more insights about the welfare impact of international capital flows at the country level. We employ the time series of welfare gains to empirically examine short-run and long-run causality from trade variables of exports and imports to welfare gains. It is a significant research endeavour because policy making circles in emerging and developing economies over the last two decades view international financial integration and trade as engines of growth and welfare which can help to improve the standards of living of the people.

The rest of the thesis unfolds as follows: Chapter 2 describes the review of relevant literature and focuses on a number of themes pertaining to the thesis. Chapter 3 presents theoretical framework for analysis as well as the empirical methodology used to investigate the short-run and long-run association of variables in this study. Chapter 4 explains the main parameters used for welfare calculations, data sources, results and discusses of *time series* of welfare gains. Chapter 5 extends the discussion and presents country experiences of welfare gains for several countries included in the study. Chapter 6 describes the results of the short-run and long-run Granger non-causality. Chapter 7 concludes along with policy implications,

28 This point refers to the process of trade liberalization which more or less has moved to a consensus as compared to financial integration. For more details see Rodrik (1998), Stiglitiz (2000), Berg and Krueger (2003), Baldwin (2004), Winters (2004), and Kose et al. (2009), Gourinchas and Jeanne (2013).

limitations and scope for further research. We provide the proofs and derivations of important equations both in the theoretical framework and empirical methodology in appendices.

CHAPTER 2
REVIEW OF LITERATURE

2.1 Introduction

This study aims to measure *country-specific* welfare gains of international capital flows and evaluate the effects of trade on welfare gains in a group of emerging and developing economies for the years 1961-2010. This chapter presents the review of relevant literature that evaluates and highlights the significance of international financial integration and trade. A vast amount of literature examines and explains the growth impact of international financial integration and its contribution toward improving the welfare of individuals in developing countries using a neoclassical economic model developed by Solow (1956). The neoclassical model emphasizes on the role of economic policy in influencing economic growth through domestic savings. This framework assumes that liberalization of capital flows contributes to the enhancment ofthe standards of living of the people. In this chapter, we motivate the discussion with theoretical implications of neoclassical growth theory which provides the basis for any study on economic growth and development.[29] This chapter is organized in various sections. Section 2.2 begins with the brief discussion of the two interrelated but different concepts of financial integration and financial liberalization. It also covers the discussion by comparing the traditional view with the *different* perspective of international financial integration. Section 2.3 discusses the basic insights and implications of the neoclassical economic model since the framework for analysis subsequently developed for measuring welfare gains is closely related to this strand of literature. This discussion is aimed at bringing more clarity about the welfare implications of neoclassical economic theory.

Section 2.4 explains in detail the two approaches used to measure welfare gains which are based on international risk sharing and capital accumulation. It also covers the empirical literature and extensions in the neoclassical approach to measuring welfare gains to relate theory with empirical evidence. Sections 2.5 through 2.7 provide a critical discussion on liberalization and the channels through which it affects economic growth and development. There are certain puzzles in macroeconomics and some of them are related to capital flows. We discuss those puzzles in section 2.8. In this study, we also aim to analyze the short run and long run relationship of welfare gains and trade channels of exports and imports. For this

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29 Aghion and Howitt (2009) explain four paradigms of economic growth which include neoclassical growth model, the AK model, the product variety model and the Schumpeterian model. In this chapter, however we will focus on the neoclassical economic model and AK model which are used to develop the framework of analysis for measuring welfare gains.

purpose, we extend the discussion and review the relevant literature regading gains from trade in Section 2.9. Section 2.10 summarizes the chapter and concludes by highlighting the contribution of the current study in the light of the limitations and gaps of extant literature discussed in this chapter.

2.2 Concepts of financial integration and financial liberalization

We begin with a brief discussion of the two interrelated but different concepts of financial integration and financial liberalization. The former relates to the liberalization of the capital account to allow for free mobility of capital in and out of the country. Capital flows occur from capital abundant rich countries where return to capital is low to capital scarce poor countries having relatively higher return to capital.[30] Financial integration, therefore, leads to efficient allocation of resources and results in improving the standards of living of individuals. Alongside capital account liberalization, another policy which contributes in economic growth and welfare through higher savings is financial liberalization in developing countries. It aims at liberalization of the financial sector which in many developing countries was used to be controlled through government rules, regulations, and interventions before the 1980s. It encompasses all segments of the financial sector. One of the main objectives of financial liberalization policies is to improve the functioning of the domestic financial markets and banks to improve economic growth.

Kose et al. (2006) provides a comprehensive overview of these two interrelated concepts. They also discuss a different perspective by incorporating the traditional view of international financial integration as well as emphasizing the potential collateral benefits from indirect channels. Foreign capital which becomes available through financial integration allows for sharing of income risk which leads to higher productivity and growth (Obstfeld, 1994a; Acemoglu and Zilibotti, 1997). These collateral benefits include financial market development, institutional development, better governance and macroeconomic discipline. Figure 4 below adopted from Kose et al. (2006) explain the two views of the impact of financial globalization on developing countries.

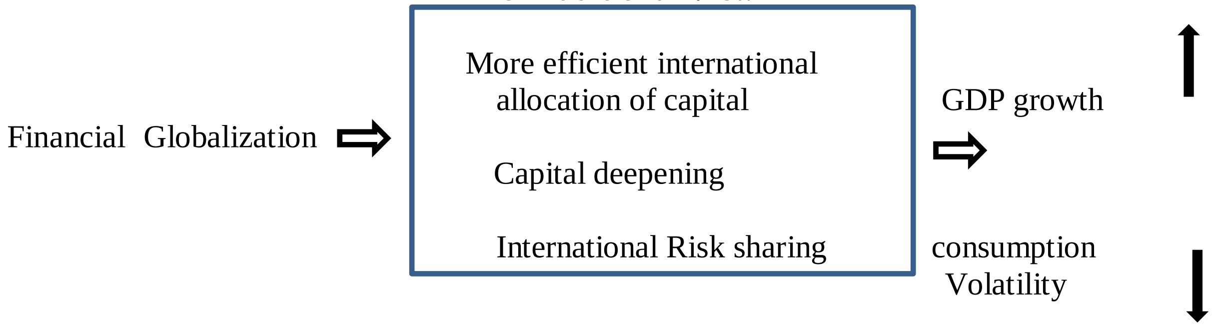
Many studies provide supportive empirical evidence about these collateral benefits from international financial integration (Levine, 2001; Rogoff, 2002; Rajan and Zingales, 2003; Stulz, 2005). Financial integration results in the transfer of technology to developing countries through FDI inflows. These flows contribute to enhancing domestic productivity of the underdeveloped countries. Finally, capital flows strengthen liquidity positions in the domestic

30 It is based on the classic case of international capital mobility explained by Musa and Eichengreen (1998)

stock markets and contribute to the development of the financial sector by fostering competition, improving regulatory regimes, and enhancing access to international financial markets.

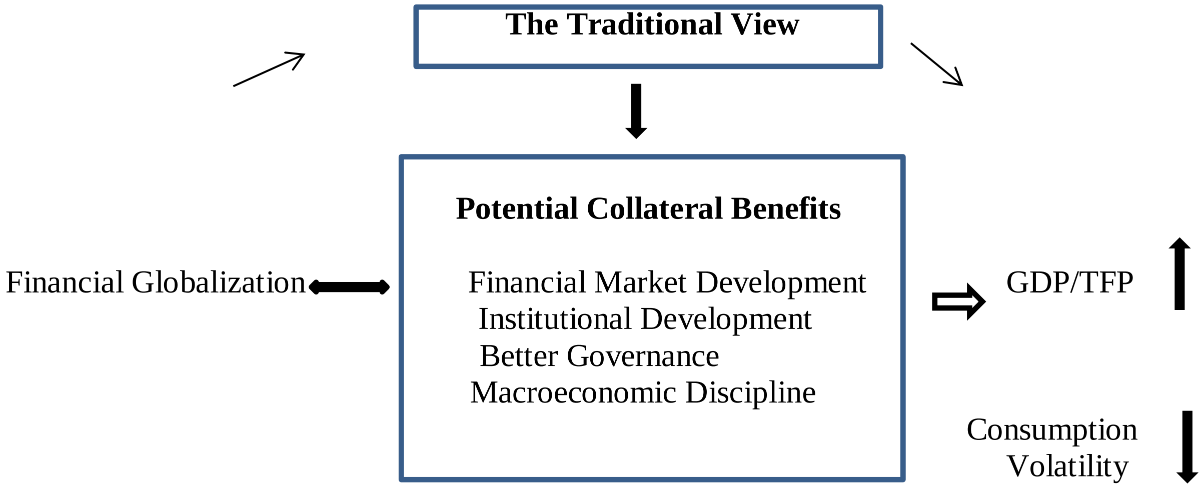
Figure 4: Two views of the impact of financial globalization on developing countries

The Traditional View



The traditional view focuses on the importance of channels through which capital flows could directly increase the GDP and reduce consumption volatility

A Different Perspective



Kose et al 2006 puts a different perspective. Acknowledging the relevance of traditional channels, this line of research argues that the role of financial globalization as a catalyst for certain collateral benefits may be more important in increasing GDP/TFP growth and reducing consumption volatility.

Source: Adopted from Kose et al. (2006).

GJ implicitly mention some of these channels but do not focus on them as these are not covered directly in the neoclassical economic model. These benefits affect growth and welfare of nations in an indirect manner and may not become fully obvious and apparent in the short run. This is also one of the limitations of the existing literature and the current study attempts to construct time series of welfare gains by incorporating both the theoretical assumptions as well as structural changes which occur in an economy. To further motivate this discussion, it is important to explain the basic insights of the growth theory which are described in the next section.

2.3 The Solow Model: Neo-classical growth theory

Solow's model lies at the heart of almost every macroeconomic model and provides the benchmark for growth and welfare analysis because of its theoretical implications. [31] Its main implication described as the Solow steady state is represented by the following Solow equation.

$$\Delta k_{t+1} = sf(k_t) - (\delta + n)k_t \qquad (2.1)$$

The first term in equation (2.1) Δk_{t+1} shows the change in the stock of capital. The terms on the right-hand side of equation indicates investment $sf(k_t)$, depreciation δ and population n. Solow's steady state denoted as k^* occurs when $\Delta k_{t+1} = 0$ and can be written as follows:

$$sf(k^*) = (n + \delta)k^* \qquad (2.2)$$

Figure (5) below graphs all the terms of this equation under the condition $k_{t+1} = k_t$ for different levels of capital stock. The first term $sf(k_t)$ is a concave function of k_t given the assumption that output per unit of effective labour increases with capital per worker but it increases at the decreasing rate. The second term $(n + \delta)k_t$ is a linear function of k_t. The two curves intersect at the point k^* which establishes Solow's steady state condition.

Solow model explains consumption patterns through key assumption of a constant saving rate. It regards consumption per capita as a fixed fraction of output per capita specified as follows:

$$c_t = (1 - s)y_t \qquad (2.3)$$

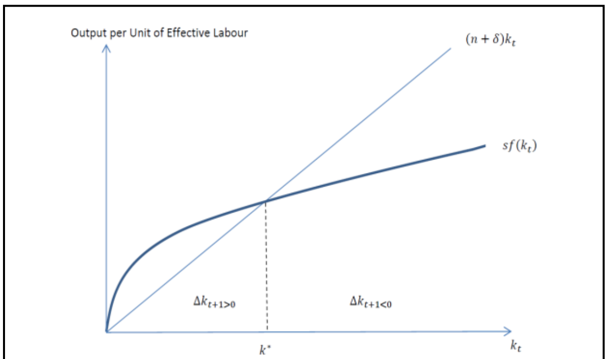


Figure 5: The Solow steady state (Vollrath, 2008)

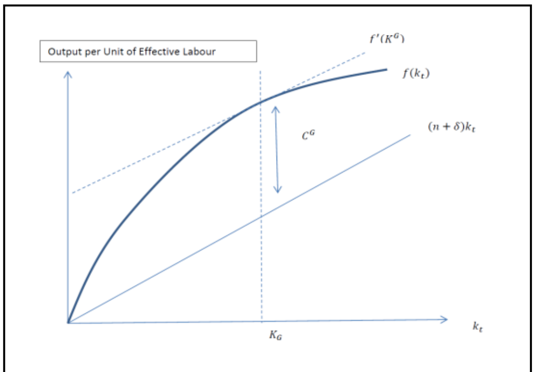


Figure 6: The golden rule capital stock (Vollrath, 2008)

Using (2.1) and (2.2) and maximizing c^* over k^* results in the steady state level of capital per worker that provides the maximum consumption in steady state.

31 This section draws from different macroeconomic texts and research papers which include Henry (2007), Vollrath (2008), Aghion and Howitt (2009), Mankiw (2009), and Jones and Vollrath (2013). We explain basic insights of Solow model to provide a background of balanced and non-balanced economic growth which constitutes one of the essential ideas in the construction of time series of welfare gains.

$$f'(k^*) = n + \delta \tag{2.4}$$

Equation (2.4) shows that marginal product of capital is equal to population growth rate and depreciation rate. The steady state level of capital that provides maximum consumption is called Golden rule level of capital (Phelps, 1961). It is shown in Figure (6).

In order to explain the phenomenon of persistent growth, Solow model, however, requires some notion of technology improvement which he refers in (1956) as the "technical progress".[32] Solow also makes certain simple assumptions for subsequent development of growth theory. An important assumption of this model implies that fraction of output used for investment which equals to saving in the closed economy is constant. Later on, a substantial literature on growth theory which analyzes consumer behaviour finds that household consumption is a much more complex phenomenon and assuming it as a fixed proportion of income is perhaps an oversimplification (Cass, 1965; Koopmans, 1965).

2.3.1 Ramsey-Cass-Koopmans model

The Ramsey-Cass-Koopmans model extends the neoclassical economic model pioneered by Solow in 1956. According to Ramsey (1928) the economic planner aims at optimal allocation of resources in the economy in an attempt to maximize utility of households. David Cass and Tjalling Koopmans make further extensions in the Ramsey model in 1965 by incorporating a decentralized environment. The utility function in the context of continuous time version is specified as follows:

$$U = \int_{t=0}^{\infty} e^{-\rho t}\, U(c_t)dt \tag{2.5}$$

In the above equation, $U(c_t)$ indicates consumption per worker, and ρ shows the rate at which this lifetime utility is discounted. The explicit form of this flow utility can be written as follows:

$$U(c_t) = \frac{{c_t}^{1-\sigma}}{1-\sigma}\ where\ \sigma > 0 \tag{2.6}$$

σ is the coefficient of relative risk aversion.[33] The Euler equation statement can be written as follows:

$$\frac{\dot{c_t}}{c_t} = (r - \rho)\frac{1}{\sigma} \text{ where } \dot{c_t} = \frac{dC_t}{dt} \tag{2.7}$$

If c_t is growing at the rate g, then the above Euler equation takes the following form:

$$r = \rho + \sigma g \tag{2.8}$$

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32 These limitations are discussed in "AK model". Original AK model is based on Arrow's work (1962) emphasizes on the role of "learning by doing" by firms in the process of production. However, Harrod (1939) and Domar (1946) also consider aggregate production function which has fixed technological coefficients. In fact, there are many versions of the AK model. It neoclassical version of Harrod-Domar was developed by Frankel (1962) and its Ramsey version was developed by Romer (1986).

33 Continuous time version of consumption behaviour can be solved either by setting up the Lagrangian or the Hamiltonian.

This is the main result and equilibrium condition of the Ramsey-Cass-Koopmans model which explains the growth of consumption over time. The term “r" in the Euler equation denotes rate of interest. Changes in consumption are dictated by the relative size of rate of interest “r" and discount rate "ρ". Euler equation (2.8) is important in stimulating further discussion for two reasons in the current study. First, it highlights the role of steady state growth rate. Second, it is an important tool to study welfare issues in an economy.

2.3.2 Capital account liberalization and neoclassical growth Model [34]

This section expands the Solow model to analyze the impact of capital account liberalization in a developing country. In the previous section, we see that the Solow equation encapsulates the effect of all factors on the evolution of capital over time. It takes the following form:

$$\Delta k_{t+1} = sf(k_t) - (\delta + n + g)k_t \qquad (2.9)$$

Equation (2.9) shows that steady state occurs when $\Delta k_{t+1} = 0$. It means the growth rate of capital per worker does not change once the economy reach that fixed level of capital per worker. Point A in Figure 7 shows the steady state level of capital stock in the economy.[35] The equilibrium condition for investment is reflected in the steady state marginal product of capital which equals interest rate plus the depreciation rate of capital which breaks down in each period.

$$f'(k_{s.state}) = R + \delta \qquad (2.10)$$

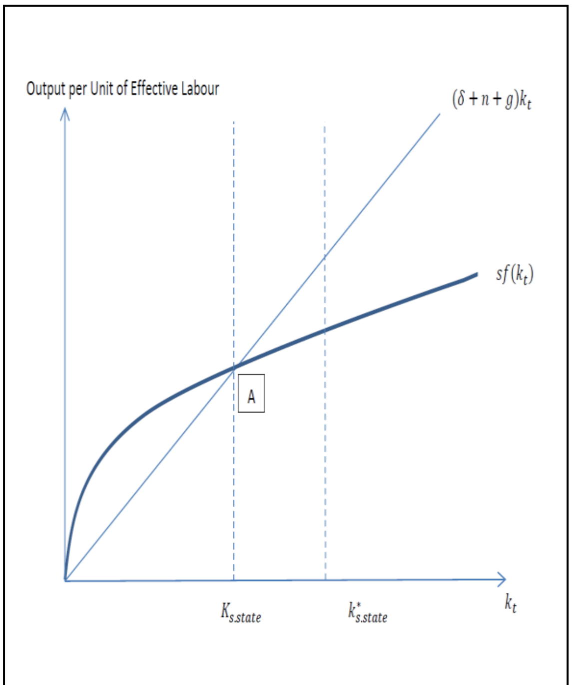

Figure 7: Capital account liberalization in the neoclassical model (Henry, 2007)

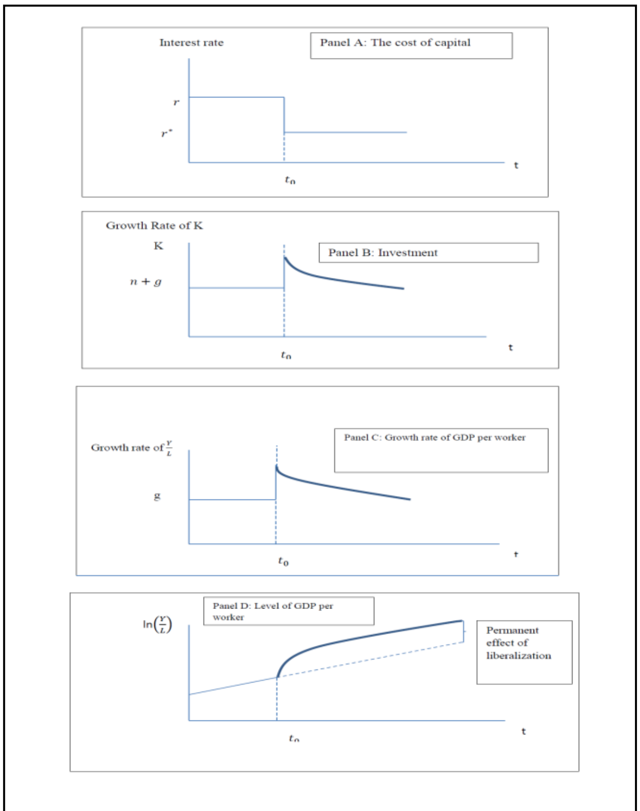

Figure 8: The impact of liberalization on the cost of capital, investment and Growth (Henry, 2007)

34 This section draws heavily from Henry (2007) and Vollrath (2008)
35 The details and figures in this section are based on discussion covered in Henry (2007).

Equation (2.10) is very important for analyzing the impact of capital account liberalization in the neoclassical model because it incorporates the rate of return on capital as well as the depreciation of the capital stock. Liberalization of international capital flows affects the domestic economy of a developing country through the cost of capital defined in terms of R in equation (2.10). Figure 8 shows the effects of capital account liberalization on the interest rate, the growth of capital and output per worker and natural log of output worker. The key message of this analysis is that while the domestic rate of return converges immediately to the world rate of return in the wake of removal of capital controls by the policy makers, the ratio of capital to effective labour does not converge with the same speed and thus, results in the short- run increase in the growth of output per worker in the economy.

2.4 Measurement of welfare gains

There are two main approaches used to measure to measure welfare gains which include international risk sharing mechanism and allocative efficiency of savings. The former enables domestic households, firms and countries to smooth their consumption patterns by borrowing from international markets in recession and lending or pay back their loans in times of recovery and expansion (Obstfeld, 1994b,c, 1995; Shiller and Athanasoulis, 1995; Tesar, 1995); Van Wincoop, 1994,1996,1999; Athanasoulis and Van Wincoop, 2000). The latter focusses on potential welfare benefits of increase in consumption which result from the capital scarcity of developing economies (GJ; Caselli and Feyer, 2007, and Hoxha *et al*, 2013). The first approach to measure welfare gains rests on the Lucas framework developed in 1987 in his monograph *Models of Business Cycles*. Before providing a critical overview of the first approach, it is important to explain the framework developed by Lucas to measure welfare cost of macroeconomic fluctuations.

Lucas (1987) measured welfare gains in terms of reduction of welfare cost of fluctuations for the first time in the US economy. He actually challenged the conventional wisdom prevailing at the time in the US that ensuring steady state output growth is important for improving economic welfare and livings standards of the people. He observed that deviations from the stable growth policies in post-World War II period are associated with minor improvements in the standards of living of the people.[36] He decomposes consumption patterns of the individuals into two parts in order to measure the welfare effects associated with the reduction in macroeconomic fluctuations. The first component grows systematically over

36 This point refers to the various laws like the Balanced Growth Act in 1978 which was passed by the US congress to ensure stable growth in the US. Lucas studies the effects of deviations from these policies in his influential work in 1987 *Models of Business Cycles.*

time and second part fluctuates with macroeconomic fluctuations in the economy. In order to understand the rationale of welfare gains, we briefly explain the Lucas approach to measuring it.

The systematic part of the consumption is called trend consumption in Lucas (1987) framework denoted by its value in year t by C_t^*. Actual consumption in the economy in year t deviates from this trend consumption by a random amount ε_t. These two components of consumption are related through the following equation:

$$C_t = (1 + \varepsilon_t)C_t^* \qquad (2.11)$$

C_t is actual consumption, C_t^* denotes trend consumption, and ε_t indicates the random deviation with zero mean and independent over time. This implies that actual consumption fluctuates over the years and equals trend part of the representation on average. Lucas further assumes that individual preferences for consumption can be summarized by the following utility function:

$$U\big(C_t, C_{t+1}, C_{t+2,} \ldots\ldots\big) \qquad (2.12)$$

Where $\big(C_t, C_{t+1}, C_{t+2,} \ldots\ldots\big)$ accounts for every sequence consumption expenditures incurred by the individuals. Given this utility function, Lucas investigates fraction of lifetime consumption required to make an individual satisfied as if it has never deviated from the trend consumption. Lucas quantifies this cost of consumption volatility and calls it μ which is shown as follows:

$$U\big((1 + \mu)C_t, (1 + \mu)C_{t+1}, \ldots.\big) = U(C_t^*, C_{t+1}^{;*}, \ldots) \qquad (2.13)$$

With this specification, the cost of eliminating the business cycles can be computed by the following equation:

$$\mu = \frac{1}{2}\gamma\sigma_\varepsilon^2 \qquad (2.14)$$

Equation (2.14) shows how to measure the welfare cost of business cycles. γ indicates an individual’s risk aversion and σ_ε^2 shows the variance of deviations from trend consumption. A higher value of σ_ε^2 implies higher consumption volatility and higher value of γ indicates that people are more averse to consumption volatility which lead to higher cost of business cycles. More specifically, Lucas employs the following constant relative risk averse utility function:

$$U(\{C_t\}) = E_0\left[\sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\gamma}}{1-\gamma}\right] \qquad (2.15)$$

Equation (2.15) shows β is that rate at which the utility is discounted over time and γ is the coefficient of relative risk aversion. E indicates a mathematical conditional expectation which is a probability weighted average of possible outcomes. Assuming $\gamma = 1$, the utility function

$\frac{C_t^{1-\gamma}}{1-\gamma}$ is reduced to $\ln C_t$. Using equation (2.14), and $\lambda > 1$, as the average growth rate for consumption, the final form of the equation (2.15) can be written as follows:

$$E\left[\sum_{t=0}^{\infty} \frac{\left[(1+\mu)(1+\varepsilon_t)(\beta\lambda)^t C_0\right]^{1-\gamma}}{1-\gamma}\right] = \sum_{t=0}^{\infty} \beta^t \frac{\left[(\beta\lambda)^t C_0\right]^{1-\gamma}}{1-\gamma} \qquad (2.16)$$

$$\mu = \frac{1}{2}\gamma\sigma^2 \qquad (2.17)$$

Lucas used Hodrick-Prescott filter of aggregate consumption in order to measure coefficient of risk aversion. The value of σ was estimated to be 1.3%. The implied cost of elimination of business cycles given the above parameter values and assumptions is calculated as follows:

$$\mu = \frac{1}{2}(1)(0.013)^2 = 0.00008 \qquad (2.18)$$

This cost expressed in terms of μ is less than one hundredth of 1%. According to Lucas, the cost of eliminating business cycles and achieving macroeconomic stability is not more than one-hundredth of 1 percent of individual's consumption over their lifetime.

2.4.1 Welfare gains from international risk sharing

Since the start of the debate of measuring welfare gains with Lucas's (1987) work on models of business cycles, a substantial strand of literature measure welfare gains from international risk sharing using a simple representative agent model economy in developing countries (Obstfeld, 1994b, 1995; Shiller and Athanasoulis, 1995; Athanasoulis and Van Wincoop, 2000; de Ferranti et al, 2000; Pallage and Robe, 2003, Kalemli-Ozcan et al; 2003). Integration enables countries to borrow from international markets in recessions to avoid the adverse consequences of economic growth on household's consumption patterns and firm's investment activities. On the other hand, when countries recover from recessions and enjoy the benefits of expansion and boom, integration allows them to repay their loans or lend extra capital to other countries. This trade of capital through international financial markets allows households and firms to pool idiosyncratic risk and contribute in smoothing consumption across economies.

The representative agent framework employed in this literature with transitory shocks considers two situations. In situation 1 there is no difference in risk sharing between actual and observed consumption behaviour of agents – consumers, producers, and economies. In situation 2, there is perfect risk sharing which enable agents to consume a constant fraction of total world consumption. Furthermore, these studies show that income and consumption dynamics of individual developing countries are extremely volatile as compared to total world consumption. As a result, developing countries have the potential of generating sufficient welfare gains through international risk sharing due to output and consumption volatility which exists in their economies. Therefore, international risk sharing allows agents in developing countries to consume a constant fraction of total world consumption as it diversifies country-specificrisks and contributes in reducing consumption volatility to generate potential welfare gains. These welfare gains are defined as the permanent relative increase in the expected level of consumption that would generate a similar level of welfare under international risk sharing (Prasad et al, 2003).

There is a wide difference in the size and scale of welfare benefits in terms of global risk sharing across developing countries. These benefits range from less than 1% to more than 6% of permanent percentage increase in the expected level of consumption that generates an equal percentage improvement in the level of welfare. Several studies from this strand of literature report these differences in welfare gains. In a sample of 49 countries which include 21 OECD economies and 28 developing countries, Athanasoulis and van Wincoop (2000) report welfare gains of more than 6.5% for developing countries and less than 2% for OECD economies. They employ a new approach to measure welfare gains based on regression framework which accounts for deviations from the world growth on variables in the information set. Inclusion of regressors that are in the information set does not require assumptions about the statistical process of output and provide direct estimate of growth uncertainty. This number of welfare gains for developing countries is comparatively higher than some previous studies. Obstfeld (1995) finds reduction in consumption volatility through global risk sharing can produce welfare gains within the range of 0.54% to 5.31% for a selected group of 16 developing countries. Welfare gains, in terms of annual percentage consumption are the highest in Zimbabwe which are 5.31% and lowest in Mexico which are 0.54%.

Subsequent literature shows the welfare gains can be as high as 10% of permanent increase in consumption in some African countries. Pallage and Robe (2003b) find reduction in consumption volatility in some low-income African countries through financial and institutional reform can result in invariable growth of welfare gains of 1% in these economies. In sharp contrast to Lucas (1987), the impact of eliminating macroeconomic fluctuations in developing countries is quite substantial in terms of consumption growth. This is reflected in the application of even a modestly risk averse representative agent framework for some African countries such as Gabon, Malawi and Somalia where elimination of business cycles results in a permanent increase of extra 1% of yearly consumption growth which is 10 to 30 times larger than its estimates for the United States.

Prasad et al. (2003) further extend this strand of literature by measuring welfare gains for a group of countries classified as more financially integrated economies MFIs and less financially integrated economies LFIs as well as advanced countries. They measure welfare gains in terms of per capita consumption which are not directly related to the group's current degree financial openness with the rest of the world. As the consumption dynamics of LFIs are more volatile as compared to MFIs, welfare gains in the former are higher as compared to the latter. Overall, these potential welfare gains are equivalent to 6% permanent increase in per capita consumption for LFIs and 2.5% for the MFIs economies. This strand of literature measuring welfare gains in various calibrated models since Lucas (1987) suggest welfare gains depend the high degree of correlation between domestic consumption and world consumption. It shows that the greater the degree of consumption volatility, the higher the welfare gains across countries. However, this strand of literature is not directly linked with the capital scarcity faced by the emerging and developing economies which start following policies of capital account liberalization more than three decades. International capital flows are considered an important determinant of overcoming this capital scarcity and generating potential growth and welfare impact for capital scarce economies. This short coming in literature was addressed by GJ who measure welfare gains for capital scarce economies experiencing capital inflows by using the standard neoclassical economic model. The current study follows classification of countries from Prasad et al. (2003) and measure welfare gains coming from the capital scarcity of these economies.

2.4.2 Welfare gains of international capital flows: A neo-classical perspective

The neoclassical economic model emphasizes welfare improvements from liberalization of international capital flows through efficient allocation of resources. The economic intuition behind this model is that rate of return is low in capital abundant rich economies and higher in capital scarce poor economies. Thus, the flow of resources from low return developed countries to high return locations of developing economies contributes in reducing the cost of capital in the latter and results in improving the standards of living of the people (Mussa et al, 1998; Fischer, 1998; Obstfeld, 1998); Rogoff, 1999; and Summers, 2000; Eichengreen, 2001).

International capital flows produce welfare gains in developing countries through faster capital accumulation and reduction in the cost of capital. This channel of measuring welfare gains through capital accumulation did not receive much attention of academic researchers in the 1990s when most emerging and developing countries pursue policies of capital account liberalization to attract foreign capital. Prior to that, welfare gains in the financial integration literature were measured in terms of international risk diversification which focuses on the role of elimination of business cycles and reduction in consumption volatility. Gourinchas and Jeanne (2006) measure welfare gains of international financial integration coming from capital scarcity of emerging and developing countries for the first time using a neoclassical economic model. They employ two forms of neoclassical model to measure welfare gains. The first type is based on Ramsay-Cass-Koopman model, explained earlier, in which countries are only concerned with the accumulation of physical capital. In the second model, human capital is incorporated along with physical capital in a "Macro-Mincer" framework.[37]

This new strand of literature investigates the role of international financial integration in capital scarce economies as capital flows help them to fill the existing resource gap in savings and investment. The framework developed by them allows for analyzing different sources of inequality across countries and incorporating them into a single optimization model. Previous literature on growth and convergence identify differences in physical capital, human capital, and total factor productivity growth as possible sources of cross country income differences (Mankiw, Romer, Weil, 1992; Barro, Mankiw, and Sala-i-Martin, 1995; Hall and Jones, 1999; Easterly and Levine). However, these studies ignore the impact of international financial integration on convergence, growth and standards of living of the people. In their welfare optimizing framework, GJ incorporate sources of cross country income differences and consider the rates of factor accumulation endogenous since financial integration is expected to result in greater accumulation of capital. Moreover, it is pointed out that the gap between rich and poor nations is better explained by differences in distortions occurring because of restrictions on foreign capital and productivity patterns existing in the domestic economy than conditional convergence.[38] This implies that less developed countries are more likely to catch up with developed economies by improving domestic productivity and removing distortions because differences in cross country per capita income tend to disappear when countries are assumed to share the same level of technology and economic fundamentals of capital accumulation. These economic fundamentals include saving rate, depreciation of the capital stock and population growth rate. As a result, an important implication of this analysis is that though financial integration eliminates differences in the marginal rate of return on capital across economies, it does not eliminate growth gaps in productivity which exist between rich and poor nations.

The findings of the analysis suggest that though some countries are able to benefit a lot by moving from imperfect capital mobility to free flows of capital but on average these gains are small compared to the gains which result from improvements in productivity patterns of

37 They follow Barro and Lee (1993) in "Macro-Mincer" framework and introduce human capital in the model.
38 The concept of conditional convergence means when countries' preferences and state of technology remain the same, then all countries moves toward same steady state. In addition, these countries will have insignificant variation in their standards of living (Gourinchas and Jeanne, 2002).

the domestic economy. Another major finding is that welfare gains remain limited even for countries receiving large amount of capital flows. In the Ramsay framework, it has been observed that even when capital inflows increase by more than 100%, current consumption of the economy goes up by an insignificant amount of only 1.7%. These negligible welfare gains are due to certain distortions which are prompted by the restrictions on free flows of capital in less developed countries. These distortions are related to the rates of return on investment in home and foreign economies.[39] If an economy persistently remains closed and does not remove the restrictions on the flows of capital, the mean effect of these distortions disappears over time as the economy accumulates capital by domestically mobilising resources under financial autarky.

In order to further explain the measure of welfare gains, GJ construct capital stock series using Heston, Summers, and Aten (2002) Penn World Tables Mark 6.1 (PWT) for a sample of 82 non-OECD countries. Welfare gains result from improvements in capital scarcity for the sample of countries with different capital output ratio. They determine the capital output ratio for the median, at the 10th and 90th percentile countries from the sample. The capital output ratio for the median country is 1.4, for the 10th percentile is 1 and for the 90th percentile is 2.1. The results show that welfare gains for the country with the capital output ratio of 1 is 3.46% of annual consumption. Welfare gains fall to 1.74% when the capital output ratio goes up to 1.4 and to 0.29% as it rises to 2.1. The calibrated results suggest that an economy must have either very small or very large capital output ratio to generate potential welfare benefits from international capital flows. Plotting these gains as a function of the initial capital output ratio, they set the lower bench mark of capital output ratio at 1.29 and higher at 4.38 for an economy to generate implied welfare gains which exceed 2% of annual consumption.

2.4.3 GJ and previous literature

These findings about welfare gains can be compared with the impact of international financial integration on economic growth examined and analyzed in a number of empirical studies using cross country regressions. Quinn (1997) systematically shows, for the first time, that capital account liberalization is positively associated with economic growth of a country. He constructs his measure of financial openness based on the details of the accounts in International Monetary Fund’s *Annual Report on Exchange Arrangements and Exchange*

39According to Gourinchas and Jeanne (2002), these distortions include credit market imperfections, taxation, expropriation, bureaucratic bottlenecks, bribery and endemic corruption present in the developing countries. According to them, the initial distortion is much higher than the average distortion.

Restrictions for a sample of 63 advanced and developing economies. The results of this empirical analysis suggest that change in the measure of international financial regulation as measured by first difference of openness is positively associated with GDP per capita. The same finding holds true for capital account liberalization. This study, however, remains unable to isolate effects of two change measures of financial openness and liberalization as both these measures are included separately in the regression analysis.

Furthermore, Henry (2003) examines the impact of capital account liberalization on economic growth starting from years in which a country introduces a policy decree and launch a country fund as means of liberalization enabling foreign investors to invest in domestic shares market. He compares the results of years relative to liberalization for five years in a row for a sample of 19 countries. Most of these economies liberalize themselves during the period 1986-1995 He explains that stock market liberalization contributes in the reduction of cost of capital which encourages firms to invest more in developing countries. A common element of this study with that of GJ (2006) is that it uses the prediction of neoclassical theory to explain that capital account openness in capital scarce economies causes a short-term increase in investment rates. Comparing changes in investment that occur in the pre liberalization phase and post liberalization period, capital stock grows by 20%. It increases from an average of 5.4% per year in the period before liberalization to 6.5% on average in the period after capital account liberalization. The increase in the growth rate of capital stock contributes in higher growth rate of output per worker. It increases by more than 1.5 times from an average of 1.4% per year in the period before liberalization to an average of 3.7% per year in the period after liberalization. In terms of percentage points, output per worker using the standard neoclassical growth accounting framework goes up by 2.3 percentage points. Henry (2003) underscores the need to identify liberalization dates for countries undergoing capital account liberalization to better test the theoretical predictions with actual data. He, however, sheds no light on welfare effects of growth and how capital account liberalization affects domestic allocative efficiency.

One comprehensive study which estimates growth effects from financial liberalization was conducted by Bekaert, Harvey and Lundbland in 2005. This contradicts some of the previous studies which show that financial liberalization does not contribute to economic growth and profits of foreign investors due to the fall in precautionary savings and asymmetric information in financial markets (Devereux and Smith, 1994; and Stigliz, 2000). Bekaert et al. (2005) contribute in the literature as they highlight the positive relationship between economic growth and financial liberalization after rigorous econometric experiments of robustness which control for variations in the world business cycle. The results of the study differ from the earlier literature on capital account liberalization which do not find strong evidence for growth upon liberalization (Rodrik, 1998); and (Kraay, 1998). In contrast to this research, this study paper emphasizes positive relationship between growth and equity market liberalization. Thus, the use of capital account liberalization measure which considers equity market openness gives rise to a more robust growth effect compared to one based on IMF restrictions or refinements suggested by Quinn 1997.

They employ pooled ordinary least squares in the econometric framework and take five year non-overlapping average growth rate of real per capita gross domestic product (GDP) as the dependent variable. The independent variables in their standard growth regressions include initial GDP (1980), the ratio of government expenditure to GDP, secondary school enrolment rates, population growth rates and life expectancy rates of a panel of 95 countries. The main variable of interest is official liberalization indicator. It takes the value of 1 when a country liberalizes its equity market or zero otherwise. The empirical analysis suggests a positive liberalization coefficient which indicates that financial liberalization promotes economic growth. They also check the robustness of the results by using alternative definitions of liberalization, grouping of countries, regional perspectives and business cycle effects in the economy. However, regression frameworks used in this study are predictive in nature and explain the relationship between equity market liberalization and economic growth and not the causality. Moreover, it is not clear whether benefits of growth translate into economic welfare of the people.

Similar to this empirical strand of literature, GJ also explain patterns of change in output growth at various horizons in the wake of financial integration in the light of capital output ratios for developing countries. A country having a capital output ratio of 1 shows the highest increase of more than 40% in domestic output growth at one year horizon. This rate of output growth falls to 3.92% at the five year horizon and 0.89% at 10 years horizon. A country with the median capital output ratio of 1.4 can enjoy output gains of more than 2.78% at five year horizons. As mentioned earlier, Bekaert et al (2005) show that stock market liberalizations affect GDP growth rate equivalent to a rise of 1% over five years. Gourinchas and Jeanne observe a growth rate of 1.13% for an economy with a capital output ratio of more than 2. This growth increase corresponds to very insignificant welfare gains of 0.29 % change in country's annual consumption that brings domestic welfare under autarky up to its level under integration.

2.4.4 Extensions in GJ framework

GJ employ Ramsey model of neoclassical growth to explain the welfare implications of international capital flows. The production function used in this framework indicates that the economy converges to a steady state balanced growth path very rapidly after integration relative to autarky. As a result, the application of Ramsey growth framework provides small welfare gains from international capital flows. Subsequent literature extends this research and begins to focus on the reasons for small welfare gains from integration. In order to assess whether global stock of capital is efficiently allocated across countries, Caselli and Feyrer (2007) estimate the aggregate marginal product of capital by considering conditions of perfect competition in capital markets for different developed and developing economies. They argue that under assumptions of perfectly competitive markets, marginal product of capital is equal to rate of return to capital. When rate of return to capital is multiplied with capital stock of economies, it gives capital income. If data on three macroeconomic variables such astotal income, capital stock, and share of capital in income is available, aggregate marginal product of capital can be determined. Thus, marginal product of capital can be derived by combining data on output and capital of the economy along with data of capital share.

Using this approach of calculating marginal of capital, they found, it is more or less the same for all countries. They compared the output losses associated with marginal product of capital in two different frameworks. Firstly, the analysis under standard assumptions of the neoclassical growth framework which uses labour and reproducible capital as inputs shows enormous variation in the marginal product of capital among countries. Marginal product in developing countries is more than double the size of advanced economies. Moreover, within developing economies the size of the variation in return to capital is thrice as high as in advanced economies. The extension in the neoclassical growth model by including land and other natural resources as inputs reverses this wide variation in marginal product of capital. The modification made in the form of separation of natural capital and reproducible capital using data from the World Bank greatly diminish the gaps in the rate of return between the developed and developing economies. In this macroeconomic data from Penn World Table 6.1, Bernanke and Gurkaynak (2001) and World Bank were used to explain the process of allocation of capital in different countries. This reduction in the gap occurs because low income countries constitute a large amount of natural capital in their total capital, which in turn, overstate the size of the income in these economies. As the result marginal product of capital obtained from total capital income share is large. Thus, output loss which is quantified with the approach of one sector model with labour and reproducible capital is almost five times higher than loss calculated with separation of natural capital and reproducible capital. These measures are considered relatively direct and simple as compared to previous literature which imposes more structure on the data for its calculation (Dasgupta, 1989; Taylor, 1998; Bannerjee and Duflo, 2005; Mckenzie and Woodruff, 2006).

Caselli and Feyrer (2007) also criticised the assumption of credit friction which generalizes differences in the marginal product of capital with one sector to more than one sectors of the economy. Differences in physical marginal of capital may persist in more than one sector even when the economy is devoid of any imperfections contrary to the assumption of credit friction. Physical marginal product of capital is higher in low income countries because of higher relative price of capital. They distinguished the rate of return on the physical capital and output per unit of output invested. The former is concerned with the measurement of output per unit of investment of physical capital. The latter deals with output per unit of investment on it when capital flows move across countries. Marginal product of capital remains the same even when it is refined by adjusting higher relative cost of capital in low income countries. Though a previous study discusses prices differences and returns to capital across countries (Taylor, 1998), Caselli and Feyrer refines this measure of marginal product of capital in order to better account for higher relative cost of capital in less developed countries. The findings of the study, thus, questions the prevailing view that return differentials across developed and developing countries is the main reason behind the debate for international financial integration to shore up growth and welfare effects in developing countries. Due to these negligible differences in returns to capital, they also caution against predicting large capital inflows upon financial integration. GJ framework predict international capital flows due to large differences in returns to capital which implies fast speed of convergence towards steady state relative to autarky. Caselli and Feyrer (2007) show that remarkably similar levels of returns rather prevent reallocation of capital across developed and developing countries.

Lucas (1990) shows that poor countries have lower endowments of complementary factors which include physical capital and human capital. Caselli and Feyrer (2007) further explain that lower capital ratios in capital scarce developing countries are less due to the frictions in international credit and capital markets and more because of the lower endowments of various complementary factors and inefficiencies in their economies. As a result, lower prices of the output goods produced in these economies as compared to capital goods result in lower capital labor ratios. In addition to complementary factors, they also identified two reasons which are responsible for low capital labour ratios in developing countries. They include higher relative price of capital and lower reproducible capital share. These two factors along with lower endowment of complementary factors equally account for differences in capital labour ratios in developing countries. They conclude that because of lower endowments higher capital flows into the developing countries are not expected to positively impact capital stocks and income. It is not only the question of capital inflows for developing countries; they must also check the capital outflows from their economies. However, this process of checking capital outflows will lead to further inefficiencies in the process of allocation of capital.

The share of reproducible capital will remain low in developing countries and capital inflows will not produce significant gains as long as the barriers pointed out by Lucas (1990) such as taxes, bribes and risk of expropriation are not eliminated in the economy. Therefore, differences in capital labor ratios and marginal product of capital equalization will exist together. The results of this study mainly depend on the wealth estimates of the World Bank and based on these estimates the land prices are trending up and capital prices are trending down. This study has not identified a single value of the marginal product of capital with regard to the public sector and private sector. Like Caselli and Feyrer, we plan to use *country-specific* capital share in output in measuring welfare gains instead of assuming constant shares across countries.

While Caselli and Feyrer (2007) highlight the role of an appropriate estimation procedure for marginal product of capital, Chatterjee and Naknoi (2010) identify another factor which affects output gains of international capital flows. GJ did not consider the role of investment goods sector in their calibration exercise while examining the impact of capital flows on welfare gains. They employ a small open economy growth model which consists of two goods consumption good and investment good. The two main characteristics of small open economy model with an incomplete asset market are related to investment goods and price of investment. Consumption good produces the investment good in the economy. The model assumes non-tradability of investment good produced from output. It also assumes that output is the same in all countries. The second important characteristic is that exogenous factors of given country which affect productivity of the capital good sector also determine the price of investment in that country.

The main theoretical predictions about the impact of capital flows on output show productivity enhancing factors such improvement in the state of technology contribute positively in increasing the rate of return to capital. This argument holds good irrespective of the long run patterns of capital stocks in the economy. Rich countries which have high per capita income thus receive more foreign capital and benefit from it.[40] On the other hand,

40 This prediction follows Lucas (1990) argument why doesn’t capital flow from rich to poor countries. See Lucas (1990) for more details.

adverse productivity factors such a fall in productivity growth contribute negatively to the return to capital causing capital outflows. The empirical analysis considers both capital inflows and outflows in sharp contrast to existing empirical research which takes into account only the former component in examining the relationship between capital flows and domestic rate of return to capital.

The second prediction shows that theoretical relationship between magnitude of capital flows and domestic rate of return is decreasing in productivity in the investment goods sector of a given economy. This finding relates to assumption of the small open economy model used in the study stating that investment goods are not tradable. Capital which moves from one country to another is transformed into the physical capital using local technology. A positive productivity shock in the investment goods sector enables the capital importing country to reduce its dependence on the foreign capital as improvement in productivity leads to higher production of capital goods in the economy.

Finally, capital flows positively affect output per worker in recipient economies. This again relates to previous argument of movement of capital across countries using domestic forms of technology in the production of investment goods. Thus, positive productivity shock not only reduces the reliance on imported capital but also increases the quantity of output of final goods because of higher output per worker in the recipient economy.

Extending the theoretical framework to the empirical analysis, Chatterjee and Naknoi (2010) estimate the coefficients of expressions for rate of return. The dependent variable is the model adjusted inflows to GDP ratios. The results show that banking flows are significant at 5% level of significance and positively related to inflows to GDP ratio. Though the empirical specification used provides results consistent with theoretical framework for flows coming from the banking sector, however, it fails to hold with regard to foreign direct investment and portfolio. This highlights that the overall empirical evidence is not strong as capital inflows respond weakly to changes in the rates of return.

In order to show the output effects, this study examines the impact of capital inflows on output growth as suggested by the theory. Out of total of 47 seven countries used in the sample, they found economic gains for the 42 countries. However the gains were quite insignificant. The economic gains as measured by output per worker from banking inflows for Congo and Zambia were around 1% and 2% respectively. It was less than 1% for all other countries in the sample. This study corresponds to the findings obtained by GJ and Caselli and Feyrer (2007) who also found insignificant gains of international capital flows for developing countries. Though the gains observed in this study are quite marginal the volatility of price of investment goods as found in the empirical analysis provides one mechanism to examine size of capital flows and ensuing gains from them. It also highlights the significance of the role of investment goods sector and uses time series variations in the prices of the investment goods to explain output effects. It is important for the current study as it aims to construct time series of welfare gains for emerging and developing economies.

While previous studies measuring welfare gains using neoclassical economic model show small welfare gains, a recent study by Hoxha et al. (2013) re-examine this issue and conclude that implied welfare gains turn out to be enormously large in size if elements of endogenous growth are incorporated in the neoclassical framework. They explain that welfare gains from free flows of capital across countries increase singificantlywhen assumptions of production technology are changed. They argue that if capital goods are considered as imperfect substitutes, then elasticity of substitution between capital goods will be less that infinity, but higher than the value to meet conditions of endogenous growth. The results of their calibration exercise show that welfare gains can be as high as 9% increase in consumption for a median country and 14% for countries confronting severe capital scarcity.

Welfare gains occur as capital flows to capital scarce countries and lowers the rate of return on capital to the level of the world rate thus improving consumption patterns of people. The assumption of imperfect substitution among capital types makes the marginal product of capital of any kind to respond less strongly to the size of aggregate stock of capital. Thus, the accumulation of capital results in a gradual fall in the rate of return compared to the neoclassical model and increases the time period to bring the rate of return down to the world rate in autarky. In neoclassical model, convergence occurs very rapidly and reduces the gains of international capital flows. Hoxha et al. (2013) conclude welfare gains of integration are large as the difference between domestic rate of return and world rate persists for long periods of time once we allow imperfection substitution of capital types. The difference in the size and scale of welfare gains calls for further research and it is appropriate to revisit this strand of literature to obtain additional insights about the factors contributing in welfare gains of international capital flows over time. We consider capital flows move continually to developing countries and aim to construct *time series* of welfare gains from international capital mobility for the period 1961-2010.

2.5 Growth and welfare impact of financial liberalization through financial development

In addition to capital account liberalization, another policy which promotes economic growth and welfare through higher savings is financial sector liberalization in developing economies. This strand of literature emphasizes easing of financing constraints through financial liberalization in order to encourage competition in the financial sector (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973). During this period, financial sector in many developing countries was primarily controlled through government rules, regulations, and interventions which restrict competition in this sector. As a result, financial intermediaries offer lower rates of return on both the saving of households as well as investment than that could have prevailed in a free market environment. These intermediaries distort allocation of credit in the presence of interest rate ceilings and allocate insufficient funds for more risky projects which carry higher rate of return. This state of financial repression not only discourages people to save more but also affects the performance of financial sector to channel those savings for more productive and profitable opportunities in the economy.

McKinnon (1973) and Shaw (1973) argue that these policies promote financial repression which prevents efficient allocation of resources and reduces prospects of growth and welfare. They, therefore, support the policy of financial liberalization through the elimination of interest rate ceilings, directed credit and other financial restrictions that distort the domestic financial market in developing countries.

Removal of interest rate ceiling is a key component of financial sector reform in the developing countries. McKinnon (1973) and Shaw (1973) investigate the impact of interest rate liberalization on household savings and suggest that this policy increases interest rates which contribute in higher savings of household. This occurs as governments in developing countries make a transition from repressed financial system characterized by artificially lower interest rates to a more open market based system to determine real interest rates. Thus, financial liberalization which entails the establishment of higher equilibrium interest rates in the money market encourage household savings accounting for both social and private time preference. It helps in preventing capital flight and promoting growth of the domestic financial sector which provides investors greater access to borrowing as accumulation of equity makes borrowing cheaper for them. McKinnon (1973) especially underscores the need to spare resources from less productive uses in the economy such as inventories held by small business people, unnecessary housing by urban elite and over investment in certain stocks of raw material which are not directly used for production or consumption. He calls it “bias towards self-finance” which can be eliminated through the establishment of higher interest rates. This policy can encourage people to save more and invest in more productive activities in the economy. [41]

McKinnon (1973) and Shaw (1973) approach, thus, paves the way for further extensions in the financial sector liberalization research and its impact on growth and welfare. King and Levine (1993) use cross country data of 80 economies in order to empirically examine the relationship between financial development and economic growth. They find that financial development contributes in the growth of per capita income, accelerates capital accumulation and raises productivity growth. Carrying forward the ideas of McKinnon and Shaw (1973), Luc Leaven (2003) develops a new measure of financial liberalization which also incorporates foreign direct investment into the domestic banking sector. The entry of foreign banks not only increases the supply of capital in the domestic economy but also improves domestic lending practices. As a result large concentrated firms cease to receive the preferential treatment at the cost of efficient investments which contribute in the economic welfare of the society. This is a potential collateral benefit reflected in financial sector development due to international financial integration.

Many empirical studies were conducted in later years to examine the role of financial sector development upon integration. Bailliu (2000) supports the argument that free flows of capital across countries contribute in economic growth through the channel of financial development. It emphasizes on the role of efficient banking sector as a key determinant of economic growth in the presence of capital account liberalization. Using a panel of 40 developing countries for the period 1975-95, the results suggest that countries lacking sound financial institutions are unable to reap positive gains from international capital flows. This is perhaps due to the correlation between poor state of financial development and distortions which exist in the financial sector of sample countries.

Likewise, Edwards (2001) provides support to the contention that capital account openness produces positive growth effects in the economy through domestic financial market development. He estimates two equations in his econometric analysis using weighted two stage least squares, seemingly unrelated regression equations (SURE), and weighted three stage least squares. GDP per capita in 1985 was used as a weight in the empirical analysis. The dependent variables in the two equations include average real GDP and average rate of TFP growth. The

41 Diaz-Alejandro (1985) examines the three economies of the South Cone (Argentina, Chile, and Uruguay) which follow policies aim at eliminating financial repression 1970s but resulted in financial crash in the early 1980s. He cautions the need to reform the domestic financial sector in the light of domestic economic conditions and calls for supervising links between domestic and international financial markets.

empirical specifications employ capital account openness measure based on IMF restrictions followed by liberalization measures developed by Quinn (1997) and control variables such as investment ratio, a measure of human capital, log of real GDP per capita in 1965, and initial GDP.

The main findings suggest that the greater an economy's degree of integration with the world financial markets, the better it's economic and growth prospects than economies with smaller degree of integration. In order to lend support to the question of how growth depends on the degree of financial market development, an interaction term of capital account openness measure with GDP per capita in 1980 was introduced. The positive sign of the coefficient of the interaction term indicates the growth increases with the increase in the degree of financial development of an economy. The sign of the coefficient of the capital account openness is negative without the interaction term. Edward (2001) contributes in the existing literature by highlighting that the impact of international capital flows differs with the state of domestic financial development. Rich countries benefit from capital flows because of well-developed financial markets while poor countries fail to reap benefits from capital flows owing to underdeveloped financial markets.

Klein and Olivei (2008), on the other hand, first examine the impact of capital account liberalization on financial development using two measures of financial intermediary development. The first one is called the liquid liabilities indicator which is the ratio of liquid liabilities to GDP while the second one takes into account the ratio of claims by financial intermediaries to the private sector to GDP. An increase in each of these indicators shows higher level of financial depth. Later on, the impact of how financial development affects economic growth of a country was analyzed.

Using annual data on capital account liberalization from the International Monetary Fund's publication Exchange Arrangements and Exchange Restrictions, the results suggest that capital account liberalization positively affects financial development in a sample of 21 OECD and 74 non-OECD economies for the period 1986-1995 and 1976-1995. The results remain valid when the study controls for initial level of financial depth of a country. Financial development, in turn, positively influences economic growth. This study employs three stage least squares in their econometric framework to analyze the impact of financial development on economic growth. Using the product of coefficient of capital account openness on the change in financial depth, and coefficient of the change in financial depth on economic growth, the findings of the study show that an increase in capital account openness measure enhances per capita income growth over the years 1976–1995 by 2.7 percentage points and 5.3 percentage points with the two measures of financial depth respectively.

One of the main drawbacks of this study is the presence of most of the OECD countries which constitute the bulk of share of the global economy as well financial resources at that time. Capital account liberalization measures do not strongly respond to financial depth in statistical sense when the sample is reduced to non-OECD countries. It, however, emphasizes that presence of strong institutions and sound macroeconomic environment is very important to achieve financial development from free capital mobility which can contribute in economic growth.

Mendoza et al. (2009) further contribute in the debate about welfare implications of financial globalization among countries which are at different levels of financial development. This study analyzes cross country variation in financial development through tightness in the borrowing constraints and supports the view that development of healthy domestic financial system is essential to realize the potential welfare gains for countries eliminating capital controls. Removal of capital controls without sound financial institutions will not only create inequality issues but also economic consequences leading to economic instability. The general equilibrium framework employed in the analysis is based on the assumptions of heterogeneous agents and incomplete assets markets.[42]

The results of this study show that though countries with a high degree of financial development may experience inequality issues but the net welfare effect is positive. On the other hand, economies with less financial development have negative net welfare effect despite negligible distribution income changes. The calibrated results also show the net welfare gain in the US economy is equivalent of 1.7% increase in consumption while other countries experience a loss of -0.4% in consumption. The main reason for this negative welfare gains is attributed to increase in cost of borrowing of capital for poor households in countries with low levels of financial development. The same cost of borrowing is lower in financially developed economies under financial integration as compared to financial autarky.

Therefore, countries with less developed financial institutions can have positive net welfare gains depending on the speed of convergence of financial markets. Thus, over the long run, the faster the speed of convergence of financial markets the greater the prospects of positive welfare gains. However, in the short run, fiscal policy can play a significant role in

42 The theory of incomplete markets explains how market imperfections affect the allocation of resources in an environment of uncertainty. It recognizes that the available risk sharing instruments exist in incomplete form (Arrow, 1963).

changing initial inequality patterns which in turn can enable economies with low levels of financial development to reap positive benefits from financial integration. Mendoza et al. (2009) contribute in the literature on welfare gains of financial integration by highlighting the consequences of inequality and efficiency gains from free flows of capital together. The literature about welfare gains from financial integration has not previously highlighted distributional consequences of reallocation of capital across countries in the light of financial development. This is also perhaps consistent with the Kose et al. (2006) *a different perspective* of financial globalization which generates potential collateral welfare benefits through financial sector development.

Financial development and institutions also affect household's propensity to save and invest in less developed countries compared to advanced economies with better financial institutions. Corneli (2011) suggests that better financial institutions encourage households to save less and invest more in an economy. In their two country model, underdeveloped economy lacks these two conditions which result in more savings and lower levels of investment while advanced country enjoys the advantages of financial development in terms of higher growth and welfare. When the two countries with varying degree of financial depth and development, liberalize their capital account regime, capital accumulation and economic growth slows down in underdeveloped economy in the short run to medium term. Long run consequences, however, vary as the economy experiences higher rate of capital accumulation as it moves towards the steady state level of capital and growth. Thus, integration results in higher steady state level of capital and growth as compared to autarky. In this framework, advanced economy experiences the opposite effect and enjoys higher level of capital accumulation and growth in the short run and medium term as compared to underdeveloped countries.

The findings of the analysis suggest that the two economies don't have only varying degree of financial development but they have different levels of accumulated capital. As a result of free flows of capital, households in advanced economy spend more and experience welfare gains at the time of opening of the capital account in terms of higher level of consumption. Consumption levels in an undeveloped economy fall reflected in negative welfare gains. This occurs because people in the underdeveloped economy invest less in domestic assets and more in external assets. Capital accumulation in a developed economy goes up in the new level of steady state. At this new steady state which results from integration characterized by higher level of borrowing, the growth of capital, consumption, and investment falls as compared to autarky. Underdeveloped economy, on the other hand, continues with the process of amassing foreign assets and start enjoying higher level of consumption at the new steady state.

Thus, an underdeveloped economy gains in the long run as compared to advanced economy which enjoys benefits of integration in the short run to medium term. Owing to the gaps between long run developments and short run to medium term dynamics, an underdeveloped economy fails to reap welfare gains from financial integration. Corneli (2011) contributes in the literature with its new findings about long-run effects of financial integration. Mendoza et al. (2009), in the preceding analysis, find different results in their analysis. It, thus, raises an important question of measuring welfare gains from international capital flows which properly account for long-run and short-run effects and is pertinent for the current study as it attempts to construct time series of welfare gains for emerging and developing economies.

Hagen and Zhang (2014) explain that world financial integration results in higher output levels both at national as well as global levels. The rise in output occurs despite lower levels of financial development as well as net capital outflows in an economy. The main reason for increase in aggregate output is that international financial integration affects two channels of the economy. Firstly, it affects cross country reallocation of total savings. Secondly it also adjusts consumption saving margins of the households within the economy. A sufficient condition for this prediction - increase in output levels at the national and global levels despite capital outflows in financially underdeveloped economy - to hold requires that total savings are interest elastic. In such a situation, savings of the households surpass the levels of net capital outflows which contribute in higher levels of investment and output. The results suggest that gross as compared to net capital flows along with higher degree of financial development are important determinants which contribute in the benefits of growth.

To test these predictions, the study uses panel data in two regions of Central and East European Countries (CEEC) and Emerging Asian economies (EAEs). It takes the ratio of financial capital inflows to GDP for country i at time period t as the dependent variable. The results suggest that the coefficient of GDP per capita growth and change in credit to GDP ratio is significant at 1% level of significance. The suggestive empirical evidence remains consistent with the theoretical predictions that capital flows are higher in economies with higher output growth rates and financial development. Another extension of the study highlights full capital mobility also contributes in distributional consequences across generations of an economy. As a result, the question of free mobility of capital remains unsettled in the policy making world. Consistent with previous literature, the study highlights the significance of financial development and suggests that a less developed country can better reap the benefits of free capital mobility by encouraging financial development when it moves from autarky to integration.

Finally, in order to highlight the time series perspective and effect of international financial integration on economic growth, on recent study by Ahmed and Mmolainyane (2014) empirically examine the role of financial integration on economic performance of a specific country case in Africa, Botswana, which makes a transition from a low income to a high middle income country in the last forty years. Using Vector autoregressive framework to study the co-integrating relationship between financial integration and economic performance of Botswana, the results suggest that although indicators of financial integration have positive signs, they are not robust and statistically significant. However, indirect channels highlighted in Kose et al. (2006) such as institutional quality, fiscal prudence and overall macroeconomic situation play an important role in economic growth. The results of the VECM illustrate positive and significant role of financial development variables which include banks' domestic assets and liquid liabilities to GDP oneconomic growth. Banks' domestic assets affect economic growth more than liquid liabilities as it encourages international trade through an increase of foreign direct investment and equity liabilities.

The study also finds positive and significant short-run relationship between stock market development and economic growth of Botswana. The results of Granger causality between financial integration variables, financial development and economic growth suggest that there is a Granger causal relationship between financial integration and financial development. The causality does not occur in terms of financial development to financial integration. The results show that growth of capital markets in Botswana also plays a significant role in economic growth. The case of Botswana is interesting as it reinforces the role of short run and long run relationship of financial integration in economic growth through the channel of financial development.

The preceding discussion highlights the role of financial liberalization on economic growth and welfare through the channel of financial development. Both theory and cross country empirical evidence support the contention that financial sector development is an important channel through which liberalization affects economic growth and welfare. It also emphasizes the significance of short-run and long-run dynamics which affect the patterns of savings, investment, growth and welfare gains. It is against this backdrop that the current study attempts to investigate time-varying welfare gains of international financial integration and benefits it creates in developing countries over the years.

2.6 Welfare gains with incomplete markets and idiosyncratic risk

A new strand of literature has recently emerged which examines the macroeconomic implications of international financial integration using the theoretical assumptions of incomplete markets with idiosyncratic risk. Angeletos and Panousi (2011) employ a tractable theoretical model that incorporates assumptions of general equilibrium and incomplete markets to examine the effect of international capital flows on accumulation of capital, current account patterns and income inequalities across countries. In this study, households comprise workers and entrepreneurs. In their role as workers, they supply labour services in the labour market of a given economy. In their role as entrepreneurs, they manage private businesses using capital of their respective household and local labour from local labour market.

The theoretical framework employed in this study assumes two countries classified as North and South where the size of uninsurable risk of safe tradable assets differ. It further assumes that while the two countries are the same, North is less risky as compared to the South. This leads to two conditions of market clearing. The first condition relates to "financial autarchy" which reflects equilibrium in the domestic market, while second condition shows "financial integration" which represents equilibrium in the world market. To analyze the impact of financial integration on economic welfare, the model introduces uninsurable idiosyncratic entrepreneurial risk. This introduction of risk highlights both precautionary motive for savings as well as the wedge between the interest rate and marginal product of capital.

The results of the study explain financial integration produces benefits for poor capital scarce countries to accumulate wealth over time. Wealth accumulation partially results from savings of the households invested in high return rich countries over time. This argument distinguishes the short run and long run effects of financial integration. The short run benefits accrue mostly to the rich countries of the North while long run benefits appear in different forms in poor countries of the South. Angeletos and Panousi (2011) contribute in the literature by highlighting factors contributing in global imbalances and causing capital to move from poor to the rich countries in the short run but creating benefits by reversing this trend in terms of wealth accumulation and higher total factor productivity growth over time in the developing countries. As a result, inequality across countries also falls in the long run. The introduction of entrepreneurial risk in the theoretical framework in the study provides a new explanation of the welfare implications of international capital flows and their direction across countries besides emphasizing their short run and long implications.

Subsequent research on the benefits of capital accumulation upon integration provides new impetus to this strand of literature with the finding that welfare effect can be large with incomplete markets and idiosyncratic risk in contrast the assumption of complete markets. Welfare gains are quite small with complete markets using neoclassical economic model (GJ). Antunes and Cavalcanti (2013) extend this literature and assume heterogeneous and incomplete markets in the neoclassical economic model.[43] In their theoretical framework, they show that labour productivity of households is affected by shocks of uninsurable idiosyncratic risk. The households face two borrowing constraints. The first is endogenous borrowing constraint and second one is natural borrowing constraint. The former is concerned with endogenous debt limits and agent is assumed to prevent himself from entering into any contract in which there is an incentive for default.[44] The latter shows that agent can continue with positive level of consumption despite no future income as long as there is a positive probability that he has some level of saving and receives some return on it.[45]

In this study, financial liberalization enables agents in developing countries to have access to foreign capital at a lower cost due to capital scarcity. The ensuing capital accumulation is positively related to labour productivity. However, when agent's labour productivity is affected by uninsurable idiosyncratic shocks, it provides him a new motive to conduct financial transactions across different time periods. In such a situation some households are better off while others become worse off. Agents who fare badly have to borrow from international markets for future protection. Free movement of capital from capital abundant countries to capital scarce countries thus provides them an opportunity to access capital at lower cost. By accessing the low cost capital, agents are able to expand their consumption possibilities.

The results show the current savers suffer 5% reduction in their consumption levels compared to initial consumption. On the other hand, agents who are able to borrow improve their levels of consumption by 12% as compared to initial level of consumption. The introduction of uninsurable idiosyncratic risk in the neoclassical model and its effect on household productivity provides a compelling reason why welfare gains are large in economies with incomplete markets. As compared to economies with complete markets, they report that welfare effects are almost five times large in economies with incomplete markets. Agents borrowing foreign capital from international capital markets gain as compared agents who are net savers and thus suffer welfare loss in financial terms.

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43 Aiyagari (1994) and Huggett (1993) have used this assumption in their analysis of uninsured idiosyncratic risk and aggregate saving and heterogeneous agent incomplete insurance economies.
44 See Kehoe and Levine (1993) for more details.
45 See Aiyagari (1994) for more details.

The study also highlights that welfare gains in mean terms have important distributional consequences. From the political perspective, the median voter prefers financial integration through financial liberalization reforms to a closed economy. Therefore, an economy with strong influence of median agent in the political system is more likely to adopt reforms and regulations aimed at promoting financial integration. On the contrary if the political power is controlled by the vested interests of the rich, it is difficult to implement reforms in such an economy. This incomplete market economy will not experience the benefits of financial integration. Moreover, institutions are also very important in determining the size of welfare gains and differences in the quality of institutions provide different degrees of welfare effects. A country with strong institutional infrastructure is expected to attract more capital inflows compared to an economy with poor institutional quality. This study is related to the current research because it examines welfare gains of international capital flows coming from capital scarcity and its associated channels. It also provides a point of comparison with the welfare gains measured with the assumption of complete markets in the light of the framework developed by GJ.

2.7 Combining capital accumulation, risk sharing and the role of capital adjustment

We see in previous discussion the welfare consequences of financial integration in terms of consumption gains separately. In the international risk sharing, welfare gains are associated with the reduction in consumption volatility through the elimination of business cycles fluctuations. The process of capital accumulation also results in higher welfare as the capital moves from capital-rich to capital-poor countries as rate of return to capital is higher in the latter than the former. While the risk sharing literature mainly follows Lucas (1997) and Van Wincoop (1994), welfare gains coming from the capital scarcity are mostly analyzed in a strand of literature started by GJ. Coeurdacier et al. (2013) attempt to combine these two approaches by using a neoclassical economic model with aggregate uncertainty. This unified structure highlights an important factor responsible for small welfare gains in emerging economies. Financial integration changes the risk profile as well as the steady state capital stock in economies. An economy with higher level of risk also regards itself as a capital scarce economy. Failure to hold this sufficient condition results in capital outflows to less riskier economies. As a result, households reallocate precautionary savings to high return safe locations (developed countries). This reallocation lowers the steady state capital stocks and by consequence the welfare gains from international capital flows.

The main findings of the analysis suggest variation in welfare gains occurs due to different stochastic structures, how big or small a country is and initial level of capital scarcity in the economy. Owing to diversity and non-monotonicity of consumption patterns over time across countries, Coeurdacier et al. (2013) suggest welfare gains are mostly insignificant for emerging market economies in a neoclassical growth framework and risk sharing mechanisms in isolation not exceeding more than 0.5% of permanent increase in consumption. It was novel interpretation of welfare gains as it highlights that high risk capital scarce economies lose on the welfare gains generated by phenomenon of convergence through this reallocation of capital.

Furthermore, Coeurdacier et al. (2013) highlight the role of capital stock adjustments costs in capital accumulation. This assumption was previously employed by Mendoza et al (2009) in their analysis on the welfare implications of financial globalization without financial development in order to examine the robustness of results. The use of capital adjustment costs accelerates the process of reallocation of capital in the economy. The inclusion of adjustment costs reduces the volatility of investment caused by the capital flows to a country with a higher productivity shock (Kehoe and Perri, 2002). As households adapts to this higher reallocation of capital in the present time period, it contributes in the reduction of its cost in future reallocation of capital. The marginal product of capital converges to the world interest rate very rapidly with capital adjustment costs. Both the studies use capital adjustment costs to slow down speed of convergence of the marginal product of capital in response to various shocks in productivity, interest rate and output production. However, welfare effects remain small in the wake of capital stock adjustment induced by the capital adjustment parameter.

Brock (2015) incorporates a new dimension of capital adjustment costs in the standard Ramsey model to examine welfare implications of international capital flows. The theoretical framework in this study shows that accumulation of physical capital is subject to linear homogeneous costs. This assumption of capital adjustment costs generalizes the investment technology in an economy. As a result, this study finds that the larger the capital adjustment costs in an economy and initial level of capital scarcity, the higher the size of welfare gains from international financial integration.

This study measures welfare gains which result from increase in the market value of capital stock as soon as a country removes capital controls from the economy. It, thus, links welfare gains with growth rate accelerations. Brock (2015) explains the phenomenon of growth rate acceleration following capital account liberalization with the help of growth rate acceleration curves. These curves show different points of initial capital scarcity and combinations of investment technology which generate equivalent relative welfare gains expressed as a percent of initial capital stock. This study, therefore, identifies another dimension under which welfare gains can be estimated from observed increases in growth rates of economies' transition paths towards the steady state capital stock at the time of opening up of capital account regime.

Unlike previous studies, which find that gains from capital account liberalization are small with capital adjustments, Brock (2015) explains that welfare gains vary proportionately with capital adjustment cost parameter. Moreover, it is proportional to the relative rate of convergence and capital scarcity when a country decides to remove capital controls from the economy. Without adjustment costs, the value of this parameter is zero, which results in approximately zero welfare increase. Welfare gains with adjustment costs are higher under conditions of integrated economies compared to autarkic economies. This strand of literature emphasizes the role of the two approaches in the context of a unified structure to measure welfare gains along with the new dimension of capital stock adjustment.

2.8 International capital flows: some puzzles

There are many puzzles of international macroeconomics some of which are related to international capital flows.[46] These puzzles provide conflicting perspective about international capital flows, therefore, it is important to briefly discuss them for better understanding the nature and impact of capital flows on welfare gains. It is also one of the related questions in the debate on international financial integration which has been discussed in various strands of literature. One strand of literature discusses this issue in the context of Lucas paradox of "why doesn't capital flow from the rich to the poor countries" which in broader terms defines the contours of financial integration across countries. Lucas (1990) questions the neoclassical prediction that capital flows from capital rich countries to capital poor economies as marginal product of capital is higher in latter than in the former. According to Lucas rate of return to capital is 58 time higher in India than United States. The existence of such a difference in return differentials requires that all capital should move from the US to India which is in fact contrary to actual data.

The famous "Lucas Paradox" is related to to certain other puzzles of international macroeconomics and finance (Alfaro, et al. 2008). The first one is the Feldstien and Horioka puzzle which observes high correlations between savings and investments in OECD countries. Feldstien and Horioka (1980) finds that changes in domestic savings rates equivalent to that of investment rates in a sample of advanced OECD countries is puzzling and questions the theoretical prediction of the open economy. In a closed economy, current account remains in

46 Obstfeld and Rogoff explain six major puzzles in international economics and finance. While the full description of all is beyond the scope of this study, we are only referring to related to savings, investments, international capital flows. For more details see Obstfeld and Rogoff (2000).

balance as the domestic savings equal domestic investment. This means that a rise in domestic savings is translated into an equivalent rise in investment. This theoretical prediction, however, does not hold in case of an open economy. In open economy situation, capital is internationally mobile and domestic savings need not equal to domestic investments even for long periods of time. As a result current account of countries need not be in balance as they gain from intertemporal trade. However, the high correlation between domestic savings and investment in developed countries belied the existence of this theoretical prediction. The two other puzzles related for the current study include home bias puzzle and risk sharing puzzle. The former shows the lack of overseas investment by the residents of the home country while the latter highlights low correlations of consumption growth which exists across different countries. These three puzzles are related to the shortage of international capital flows in terms of international equity holdings (Alfaro, et al, 2008).

Gourinchas and Jeanne (2013) revisit the Lucas paradox by analyzing the patterns of net capital flows to developing countries using a neoclassical economic model. The underlying theoretical framework of the neoclassical model requires countries with higher productivity growth to attract more foreign capital compared to economies with lower productivity. The results of the study show that there is a negative relationship between net capital flows and productivity growth for many non-OECD countries. The capital flows from developed countries to developing countries are not only *de minimis* but allocation of these flows among developing countries contradicts the theoretical prediction of the standard textbook model. This is referred to as the "allocation puzzle" related to both the capital flows as well as their effects on economic growth and welfare. It is relevant for the current study because it focuses on measuring *country-specific* welfare gains in the light the countries' respective macroeconomic conditions and issues identified in such previous works provide further motivation to current research.

2.9 Gains from trade

The idea that trade contributes in economic and welfare gains is regarded as one of the most important insights of international economics and trade liberalization. The theory of absolute advantage built on the ideas of Adam Smith (1776) lays the foundation of the debate of benefits from free trade. It states that a country enjoys an absolute advantage when it is more efficient at producing a good or service at lowest resource cost as compared to another country and specializes in its production. Ricardo (1817) further extends this debate and distinguishes the trade theory by emphasizing on the role of comparative advantage in trade instead of absolute advantage. He points out that when a country is more efficient in the production of all commodities, it is the comparative advantage in production rather than absolute advantage that drives specialization and gains from trade.

Though earlier theories of trade emphasize the gains from it, policy makers in most countries do not incorporate elements of free trade in economic policies and programs for long periods of time in the 20th century. As a result, protectionist theories based on import substitution principles form the basis of trade policies of many developing countries (Prebisch, 1950; Singer, 1950). Protectionist theories hold that developing countries' trade is concentrated in raw materials and primary commodities. Outward oriented trade policies which encourage more open trade across economies contribute in the reduction of international prices of these goods and services and further widen income gaps across different sections of the society. Moreover, this thinking rests on the belief that developing countries have the potential comparative advantage in manufacturing sector of the economy which requires initial protection to catch up with the advanced countries in the global economy.

Protectionist thinking which prevails in the policy making circles for almost three decades from 1950-1980s could not prevent economists to embark on investigating the growth and welfare implications of alternative trade policies based on liberalization. The discussion about the role of alternative trade policies in facilitating economic growth and welfare of economies through exports originates in 1970s (Little, Scitovsky and Scott, 1970; Balassa, 1971). It receives further stimulus with the seminal work of Krueger (1978) and Bhagwati (1978). This pioneering NBER project investigates trading patterns of 11 individual countries[47] and identifies exports bias[48] which exists in the structure of these economies. The degree of bias measured shows whether a country is perusing export promotion policies or import substitution strategies. This research project contributes in the trade-growth literature as it defines the concepts of trade orientation and liberalization and starts a new debate about the effects of trade liberalization on economic growth and welfare of nations.

Since then, the policy debate in the literature on trade and development takes a new turn in the 1980s since it focuses more about the cost and benefits of trade liberalization in the developing countries. Balassa (1982) finds that countries grow rapidly with lower anti-export bias as compared to countries showing a higher degree of anti-export bias in trade policies. He suggests protectionism costs economies and discourages export growth which can play a vital

47 Developing countries in this list include Brazil, Chile, Columbia, Egypt, India, Israel, Korea, the Philippines, Pakistan, and Turkey.
48 In this study export bias refers to ratio of the effective exchange rate paid for by importers to the exchange rate for exporters in an economy. A trade regime exhibits export bias if the value of this ratio exceeds 1.

role in generating economic growth and welfare. Balassa (1985) further strengthens this finding by suggesting that outward oriented policies which encourage exports expansion positively affect economic performance of economies. This view that countries with outward oriented trade policies grow faster than inward oriented trade regimes paves the way for further extensions in the literature on trade liberalization and its associated gains through economic growth and welfare.

2.9.1 Theoretical channels of gains from trade

Gains from trade are distinguished into static and dynamic gains. To further motivate this discussion, it is important to discuss theoretical channels and links through which trade affects economic growth and welfare. Standard textbooks start the discussion by explaining the static models to show that there are gains from trade and emphasize that protectionism prevents efficient allocation of resources.[49] These gains appear in the form of expansion of consumption possibilities. Without trade, a country's consumption and production possibilities remain the same. Trade allows each economy to consume more than its production possibilities and makes individuals better off by enlarging range of consumption choices. These statics models also use the assumptions of micro-economic theory and explain that consumer welfare increases in a small open economy with free trade relative to conditions of autarky. This increase in consumer welfare results from the improvement in the country's terms of trade. A country which experiences an improvement in the terms of trade show higher consumers gains as compared to countries exhibiting falling terms of trade.

Empirical research also emphasize that static gains bring welfare for consumers from higher quality and variety of products which results in the expansion of consumer baskets. Feenstra (1994) identifies these gains from consumption of increased variety. These gains result from reduction in consumer prices which can be measured through consumer price index. A similar set of gains accrue to producers who experience rise in real income due to international trade. Romer (1994) identifies such gains for producers realized through an increased variety of intermediate goods which follow trade integration.

Moreover, gains from trade are explained by linking AK model to international trade and ideas of terms of trade. This exercise of explaining a related channel of gains from trade was investigated by Ventura (1997) and Acemoglo and Ventura (2002). It shows that countries with falling prices of exports experience decrease in the marginal product of capital in the domestic economy. However, they contribute in the rise of demand for products and value of

49Krugman et al (2012), International economics theory and policy.

marginal product of capital in other trading economies. This trade channel produces a terms of trade effect which lead to *de facto* diminishing returns in the home country. This related trade channel is important as it shows that trade based on specialization leads to stability in the world income distribution and enhances welfare effects of trade.

A recent study by Arkolakis et al (2012) investigates the size of gains from trade by employing a range of trade models based on perfect competition, monopolistic competition and trade in intermediate goods. These gains are measured in terms of percentage change in real income required to compensate a consumer for a move to complete autarky. These gains depend on the trade cost elasticity – elasticity of imports with respect to change in trade costs. For the United States, they estimate welfare gains of 2.7% expressed in terms of percentage change in real income. While consumption gains from trade in the framework developed by Feenstra (1994) and Romer (1994) can be relatively higher and empirically questionable in Acemoglo and Ventura (2002), Arkolakis et al (2012) show the gains especially measured in Romer's (1994) framework are sensitive to different theoretical assumptions. They point out that under heterogeneity the size of the gains become smaller because of the low levels of consumption of new varieties after liberalization of trade. They refer to new varieties as "marginal varieties" and consumption of these varieties may remain small in developing economies.

The economic intuition of static models explaining static gains from trade ignore intertemporal factors which affect current production and consumption decisions. Intertemporal optimization in an open economy implies that a country consumes more than it produces in each period. As a result it is able to achieve higher levels of utility by shifting current consumption to future consumption without corresponding shift in production. These consumption and production decisions are important drivers of long-term growth and require investment in physical and human capital as well as research and development in order to enhance levels of productivity. Theoretical developments of the 1980s and 1990s also focus on connections between trade, growth and economic welfare through innovation and productivity channels. Many studies in literature explore and emphasize these channels which contribute in dynamic welfare gains (Grossman and Helpman, 1989, 1991a, 1991b).

The emergence of the new growth theory further explains that trade results in gains because entrepreneurs and inventors benefit from increase in the size and integration of markets (Rivera-Batiz and Romer, 1991). This strand of literature focuses on measuring dynamic gains from trade and study the long-run impact of trade on the living standards of the people. This is relevant for the current study since it attempts to explain the long-run relationship between welfare gains and trade channels of exports and imports. The previous discussion about welfare gains from international capital flows shows that there are certain potential collateral benefits for developing countries not restricted to just capital flows but "What comes along with capital flows" (Kose et al. 2006). These potential collateral benefits include financial market development and better institutions, governance, and macroeconomic policies and occur through higher GDP and productivity growth over a period of time. The second study in this thesis aims at testing the short-run and long-run Granger non-causality of welfare gains with trade channels of exports and imports in MFI and LFI economies.

Many studies highlight the role of trade in producing dynamic gains in terms of output effect and productivity growth in the domestic economy. Baldwin (1992) explains that liberalization of trade produces a dynamic effect on income and welfare of the country. The overall size of the dynamic effect which includes both static and dynamic effects ranges from 6% to 16% increase in income. In his model optimal consumption is a function of time and welfare gains result from differences in social and private rates of returns. Grossman and Helpman (1994) explain that international trade contributes in productivity gains of a country associated with the economic patterns and policies of its trading partners. Coe and Helpman (1995) provide additional evidence on trade and research spillovers across economies. They suggest that a country's productivity growth depends on both domestic and foreign research and development (R & D) capital stock. The latter is constructed as the weighted average of domestic stocks of a country's trade partners. Trade across developed and developing countries enhances productivity growth of a developing economy through the beneficial impact of foreign R & D capital stock. Domestic productivity growth responds strongly to foreign R & D capital stocks with increasing degree of openness.

Several studies highlight dynamic gains which occur through technology transfer and knowledge spillover effect from more advanced countries and help to enhance and strengthen domestic productivity in less advanced nations (Sach et al, 1995; Robinson and Thierfelder, 2002; Keller, 2004, Alesina et al, 2005). The main results of these studies suggest that a developing economy reaps the benefits of R & D conducted in advanced exporting economies through the import of intermediate and capital goods. In addition, trade also allows for sharing of income enhancing ideas which contribute in sharing of dynamic gains of trade through better income distribution and encourages further development of new ideas (Jones and Romer, 2010). Subsequent research further accentuates this argument and emphasize the significance of international integration and trade in promoting flow of knowledge for higher growth and welfare across the world economy (Melitz and Redding, 2014; Grossman and Helpman, 2015).

Furthermore, welfare gains occur from trade in parts and foreign direct investment through technology transfer. Trade in parts and components results in specialization and constitute an important element of developing countries import sector which lead to welfare gains in terms of higher output and employment (Arndt, 1999). Foreign direct investment is one of international capital flows which countries attract in order to achieve higher output growth. This link between trade and capital flows is also relevant for the current study which focuses on measuring country-specific gains and analyze the causal relationship of welfare gains with trade. In the context of country-specific analysis, there is also evidence of welfare gains through higher productivity growth from foreign direct investment. Blalock and Gertler (2008) find multinational firms investing in emerging markets such as Indonesia positively affect the productivity of local firms and contribute in the reduction of input prices through transfer of technology. This channel contributes in productivity gains of 3% to 5% in the Indonesian firms following learning through exporting.

Nguyen and Timoshenko (2017) suggest that these gains, however, depend on whether entry of the firms in a market is free or exogenous. The free entry assumption requires that all firms must first incur a sunk cost before they decide to enter the market based on their productivity. The exogenous entry condition allows only a fixed number of firms to make entry decisions without incurring a sunk cost as these firms have already realized potential levels of productivity. When the entry is exogenous, consumers reap the benefits of aggregate profits as dividends. This follows an adjustment mechanism in the dividends and offsets the relative rise in real wage as the extra dividend received by consumers is proportional to the total wage bill of the firms. This leads to lower level of welfare gains under the assumption of exogenous entry relative to free entry as the relative welfare level remains insensitive to variable trade costs.

Brooks and Pujalas (2017) extend this debate of welfare gains from trade by identifying four channels through which welfare changes along transition paths in dynamic and static models. These channels include the transition channel, the capital channel, the composition channel and elasticity channel. The transition channel considers welfare changes induced by the transition of lowering trade costs, the capital channel accounts for the resulting increase in capital accumulation that follows trade liberalization, the composition channels highlights welfare effects due to changes in relative composition of investment and consumption goods and finally the elasticity channel which explains to what extent imported and domestic consumption goods substitute each other. In sharp contrast to the predictions of static models which hold that consumption increases in response to increase in imports, Brooks and Pujalas (2017) show that this key finding no longer remains valid along transition paths in dynamic models. In static models, higher import intensity implies higher gains from trade. It is also true in case of long-run in a dynamic model but in the short-run welfare gains are lower following a trade cost reduction. The transition path which accounts for changes in the short-run reflects higher intensity of investment goods relative to consumption goods. This short-run and long-run separation of welfare effects provides space for further research and the current study is aimed at examining the effects of trade on welfare gains to find out the potential Granger-causal relations which may exist between them.

The previous research shows significance of international trade in generating gains employing theoretical models of consumers and firm behaviour. It also explains mechanisms which identify gains from international trade. The current study develops a country-specific measure of welfare gains based on increase in consumption due to financial integration relative to autarky. It focusses on measuring country-specific welfare gains to account for additional factors associated with financial integration andcontribute in welfare gains. These factors include capital's share in output, productivity growth and depreciation of the capital stock. We, therefore, review mechanisms which identify both consumption and productivity gains from international trade.

2.9.2 Quantification of gains from trade

Furthermore, another strand of literature focuses on the quantification of gains using various theoretical models and empirical frameworks for countries which adopt World Trade Organization (WTO) rules and regulations or enter into free trade agreements. Harrison et al (1997) measures aggregate welfare gains for the world economy which result from the adoption of rules and regulations of the Uruguay Round. Using a numerical general equilibrium model, they document that welfare gains are significant for the world economy which are worth ($) 96 billion per year in the short run and rise substantially to ($) 171 billion per year in the long run when capital stocks are adjusted in an optimal manner.

Brown (2005) makes empirical assessment of the gains in Japan which come from the theory of comparative advantage and report that welfare gains from trade equivalent to about 8% to 9% of national income in this economy. Caliendo and Parro (2015) measure welfare effects for three North American economies forming North Atlantic Free Trade Area (NAFTA) and find these effects are highest in Mexico as compared to US and Canada. Welfare gains in Mexico are higher by more than 15 times than the other two economies. This may also suggest international trade generate higher gains in emerging and developing economies as compared to developed economies. In the current study, we attempt to focus on the emerging and developing economies and use this insight from trade literature to analyze welfare gains from international capital flows and their causal relationship with trade channels.

Ravikumar et al. (2017) measure welfare gains using Lucas's (1987) approach by evaluating the transition paths between initial and new steady states. This dynamic measure of welfare gains considers that international trade contributes in capital accumulation of economies in each period. They extend multicountry Ricardian framework and include relative price of investment and investment rate as endogenous measures to make adjustments costs in capital accumulation and allow countries to borrow from abroad over time. The calibration results show that welfare gains are about 60 per cent of those which are measured with models of balanced trade and compare only the steady states instead of transitional dynamics. In addition, these welfare gains are more than three times relative to static situations which do not account for periodic changes in an economy. It suggests that trade liberalization generates welfare losses for small countries in the short run as they face trade deficits and accumulate capital at a faster rate than large countries. The small countries, however, experience higher welfare gains in the long run as they are able to improve trade balance over the years. This study is relevant for the current research as it examines the casual relationship between welfare gains and trade to account for welfare change in the short run and long run.

The idea that trade openness promotes growth and welfare receives substantial support from the success of Asian economies catching up with the convergence club of advanced countries (Page and Campos, 1993). However, subsequent developments of the 1990s expose the fragility of this literature as it focusses more on contribution of trade in growth in terms of its increasing volume and less on social and economic consequences of trade and openness (Rodriguez and Rodrik, 2000). Later on, Frankel and Romer (1999) highlight the empirical issues important in examining the impact of trade on the living standards of the people. They show that cross country regressions cannot fully reflect the effects of trade on the standards of living of the people as countries with high income levels trade more than countries with lower income levels, thus failing to take into account the endogeneity of the trade share in empirical specifications.

Furthermore, some studies contend that growth from trade without its ensuing benefits for the poor may lead to social discontent and deepens poverty in less developed countries (Bhagwati and Srinivasan, 2002). International trade may also trap some countries into a Malthusian regime and prevents them from reaping the benefits of modern growth (Galor, 2005;

Galor and Mountford, 2008).[50] The development of this research sparks a controversy about the distributional effects of international trade as benefits continue to accrue and concentrate to high income segments of society who were supposed to share them with people of lower income levels (Goldberg and Pavcnik, 2007). This raises important questions about the welfare implications of international trade and direction of causality between trade and welfare

Very few studies, however, empirically analyze the casual link between trade and welfare of economies through the consumption channel. Topalova (2004) investigates how trade reform affects consumption in India and finds positive impact of trade on consumption indicated by the decline in poverty. Porto (2006) explains impact of trade liberalization on household welfare in Argentina which is adversely affected because trade causes rise in prices of goods households mostly consume. On the other hand, his analysis suggests that changes in the prices of traded goods result in the reduction of the prices of non-traded goods which include health and education services. These services are largely consumed by the people of higher income groups in Argentina. These findings regarding trade liberalization by incorporating consumption channels indicate an increase in inequality in Argentina's economy. Porto (2006) contributes in the literature on trade and welfare by highlighting the significance of the consumption channel in the economy.

Goldberg and Pavcnik (2007) extend this debate on trade-consumption nexus by highlight the inequality patterns in developing countries. They observe that trade, globalization and inequality are increasing together and contrary to conventional wisdom trade liberalization is not benefiting to the people of the lower income groups. This study is relevant for the current thesis as it also points out the significance of establishing causal link between trade and inequality in the light of consumption channel. However, Goldberg and Pavcnik (2007) point out consumption channel receives very little attention in the debate about the benefits of trade. Later on, few studies also point out that free trade through tariff reduction benefits people from higher income and result in concentration of wealth amongst the few, but again ignore the consumption channel in the economy (Nicita, 2009). A recent study by Melitz and Redding (2014) attempts to identify missing gains from trade from endogenous changes in productivity but they have not taken into the account consumption channels for analyzing gains from trade. The second part of the current thesis attempts to analyze the case specific causal relationship

50 Malthusian regime refers to the phenomenon in economies where long run living standards grow extremely slowly over time.

of welfare gains measured in the first part in emerging and developing economies with trade channels of exports and imports.

One of the motivations of investigating this causal link is that developing countries are adopting trade liberalization policies over the last three decades. These policies produce both the short-run and long-run consequences for the people of these economies. The welfare measure constructed in the first part of this dissertation allows for the time series analysis of welfare gains with trade channels of exports and imports. We aim to empirically examine this causal relation of welfare gains with trade to evaluate the short- run and long- run effects of exports and imports onwelfare gains.

2.10 Summary

This chapter reviews the relevant literature by focusing on the measurement of welfare gains under two main themes: welfare gains from international capital mobility and gains from trade. In this section, we summarize the main findings of relevant studies associated with these two main themes. It begins with the neoclassical economic theory since it provides the basis of any research on economic growth. It explains the dynamics of the neoclassical economic model pioneered by Solow (1956) in order to have a better understanding and clarity about it theoretical implications. It highlights the conditions of the Solow steady state and Golden rule capital stock to initiate discussion about consumption and economic welfare which are the key elements of research for the current study. The Golden rule of accumulation holds good as long as the economy is stable and does not face macroeconomic fluctuations. As a result output per capita does not grow in the steady state. However, this is not consistent with the persistent growth rates experienced by many countries in the global economy. We turn our attention to the AK Model which explains some of the missing links in the Solow framework and extends the discussion on growth theory.

In order to further establish connection between consumption and economic welfare, we explain Ramsey-Cass-Koopman framework. It is a representative agent model employed in growth literature for analyzing welfare issues and implications of economic policies. This micro founded approach incorporates time discount rate into the utility of the households in order to examine patterns of present and future consumption. This discounting factor allows for optimal consumption choices on the part of individuals as it reflects their preferences for the present consumption instead of the future. This framework is helpful in evaluating the welfare consequences of representative households in contrast to the Solow model which analyzes aggregate output and consumption.

After discussing the relevant growth literature, we explain the theory behind the welfare impact of capital account liberalization in a developing country. We explain the two approaches used to measure welfare gains in the integration literature which include international risk sharing and allocative efficiency of savings. We briefly discuss the first approach which starts with the pioneering work of Lucas in 1987. We, however, primarily focus on the key findings of the second approach which measures welfare gains coming from capital scarcity as it is closely related to the current research and the framework of analysis subsequently developed is based on it. Finally, we discuss gains from trade to highlight the significance of welfare gains measured in the current study and empirically analyze its causal relationship with trade channels of exports and imports.

The main findings of relevant literature about measurement of welfare gains from international capital mobility suggest that there is a wide difference in the range of welfare gains measured under financial integration relative to financial autarky. The analysis shows that the question of how big or small are gains from international financial integration is central in the debate about the role of capital account liberalization and its welfare consequences. The neoclassical economic model postulates that capital flows from capital abundant countries to capital scarce countries as the marginal product of capital is more attractive in the latter than the former. International financial integration in terms of free capital mobility allows for a more efficient allocation of resources and contributes in economic welfare in terms of increased consumption relative to autarky. However, these welfare gains are quantitatively very small as the economy converges to a balanced growth path in autarky (GJ).

Subsequent literature explains the reasons for these small welfare gains. Caselli and Feyrer (2007) point out that return differentials are not in fact large as assumed by Gourinchas and Jeanne 2006. In fact, these differentials in the marginal product of capital are remarkably similar which prevent any worthwhile reallocation of resources across developed and developing countries. Chatterjee and Nankio (2010) highlight the role of investment good sector in output gains but could not find significant welfare gains. Some studies highlight the necessary role of financial sector development emphasised by McKinnon and Shaw in 1973 in realising potential welfare gains from international capital flows [(Mendoza, 2009); (Cornelli, 2011); and (Hagen and Zhang, 2014)].

A number of studies based on cross country regressions find mixed evidence of the impact of international financial integration on economic growth. Many studies find that there is a positive correlation between international capital flows and economic growth (Quinn, 1997; Bailliu, 2000; Henry, 2003; Bekaert, et al, 2005; Klien and Olivei, 2008). On the other hand, a set of empirical studies find no supportive evidence of international financial integration and economic growth (Rodrik, 1998; Kraary, 1998; Edison, et al, 2004). These empirical findings, however, are more relevant for growth and therefore, difficult to translate into some welfare numbers which can explain the patterns of domestic welfare.

The main findings about the relative literature of gains from trade suggest that gains from trade are distinguished into static and dynamic gains. Static gains bring welfare for consumers from higher quality and variety of products which results in the expansion of consumer baskets (Feenstra, 1994) while dynamic gains also take into account intertemporal factors which affect current production and consumption decisions. These consumption and production decisions are important drivers of long-term growth and require investment in physical and human capital as well as research and development in order to enhance levels of productivity (Grossman and Helpman, 1989, 1991a, 1991b).

Many studies also attempt to quantify welfare gains from international trade (Baldwin, 1992; Harrison et al, 1997; Brown, 2005; Caliendo and Parro, 2015). Given the heterogeneity of countries, and trade policies, welfare gains from international trade also vary in size and scale and depend on various theoretical assumptions of trade models which include perfect competition, monopolistic competition and trade in intermediate goods. In addition, several other studies highlight dynamic gains which occur through technology transfer and knowledge spillover effect from more advanced countries and help to enhance and strengthen domestic productivity in less advanced nations (Grossman and Helpman, 1994; Coe and Helpman, 1995; Sach et al, 1995; Robinson and Thierfelder, 2002; Keller, 2004, Alesina et al, 2005).

We also point out a number of limitations and gaps which exist in the relevant literature reviewed in this chapter. The difference in the size and scale of welfare gains from capital accumulation in an economy pursing capital account liberalization indicates that these gains differ with theoretical assumptions and settings employed to measure them. First and foremost, as mentioned in the review, there are two approaches to measure welfare gains through international risk diversification and capital accumulation. However, very few studies attempt to integrate these two approaches in measuring welfare gains. Coeurdacier et al. (2015) attempts to combine these two frameworks by bringing risk sharing and capital accumulation together in global numerical methods. However, majority of the studies measure welfare gains using these two approaches separately.

Secondly, studies which investigate welfare implications of international financial integration coming from capital scarcity use assumptions of the standard neoclassical growth models to estimate its benefits. The production structure used in these studies implies that countries converge towards the balanced growth path very rapidly in autarky since capital flows tend to bring down the domestic rate of return to the world rate in financial integration relative to financial autarky. As a result welfare gains from integration are very small. Hoxha et al. (2013), however, adopt the production structure which considers capital varieties as imperfect substitutes to slow down speed of convergence in autarky. The incorporation of elements of endogenous growth in the neoclassical framework brings the domestic rate of return to the world rate slowly in autarky and results in large welfare gains. This study is guided by the assumption of steady state and ignore structural changes which occur in an economy over time.

Thirdly, there exists a gap in the relevant literature conspicuous by its absence of time series analysis of neoclassical growth models. The neoclassical model predicts that capital mobility across countries results in temporary increase of growth rate in the per capita income that permanently enhances the standards of living of the people. The previous empirical evidence analyzed in cross country regression frameworks fail to find robust evidence of integration on growth because these studies were aimed at testing permanent growth effects of liberalization. Henry (2007) points that cross country regression framework is not an appropriate procedure to analyze growth effects since capital accumulation process is subject to diminishing returns in the neoclassical economic model.

Fourth, the studies reviewed consider factors of the US economy such as time preference rate, total factor productivity, population growth and capital's share in output to measure welfare gains in calibrated models. No study to the best of our knowledge use *country-specific* values of these parameters in measuring welfare gains. It is very important to use *country-specific* factors directly in measuring welfare gains to account for structural transformation in emerging and developing over the years.

Finally, we find from the review of related literature on gains from trade that very few studies analyze the role of trade in welfare of economies through the consumption channel. Some studies consider consumption but mostly focus on household survey and ignore the causal link of consumption and trade (Topalova, 2004); (Porto, 2006); (Nicita, 2009). Goldberg and Pavcnik (2007) also observe that consumption channel has been largely ignored in the debate on the welfare effects of trade. One of the key objectives of the second part of this study is to analyze the short-run and long-run relationship of welfare gains measured in part one in terms of annual increase in domestic consumption with trade channels of exports and imports.

The preceding discussion provides insights regarding the role of international capital mobility and trade in welfare gains and highlights various shortcomings and limitations which exist in the extant literature. The current study contains elements in common with many previous studies, however, it further contributes to this strand of literature in several ways. Firstly, the previous literature employs the argument of steady state or long-run growth for measuring welfare gains. This characteristic constitutes an essential feature of most growth models which follow Kaldor facts and Uzawa steady state growth theorem. However, there are systematic and structural changes which occur in various sectors of the economy and affect macroeconomic conditions (Chenery, 1960; Kuznets, 1973; Kongsamut, Rebelo, and Xie, 2001; Ngai and Pissarides, 2007). Many growth models also account for these structural changes as well as characteristics of long-run economic growth (Matsuyama, 1992; Caselli and Coleman, 2001; Gollin et al, 2002; and Hall and Jones, 2007). Moreover, Acemoglu and Guerrieri (2008) demonstrate that factor proportion differences across economic sectors result in non-balanced growth without fundamentally altering the long run properties of economic growth. Previous literature on welfare gains and international capital flows do not account for these systematic and structural changes which occur in economies from time to time. We consider that measuring country wise time-varying welfare gains in the light of domestic macroeconomic conditions and chracteristics is an important contribution in literature and provide additional insights about welfare effects of international financial integration.

Secondly, unlike GJ and Hoxha et al. (2013), who calculate welfare gains coming from capital scarcity at a point in time based on standard neoclassical and endogenous growth settings, the current study constructs *time series* of welfare gains for the period 1961-2010. We consider implied welfare gains which result from differences in domestic and world rates of return vary across countries over time. This allows us to investigate short-run and long-run effects of international financial integration due to countrysize, level of risk and degree of initial capital scarcity, and changes in macroeconomic measures.

Finally, measurment of time-varying welfare gains provides an opportunity to conduct time series analysis to identify an association of welfare gains with trade channels. While this association has been investigated in cross country regression frameworks in many studies which implicitly analyze permanents effects of capital flows and trade on long-run growth, the extant literature is devoid of studies which emprically examine effects of trade on welfare gains within countries over time. The current study contributes to the existing literature because it aims to analyze the casual link between welfare gains and trade by using the *time series* of welfare gains to investigate its short-run and long-run relationship with trade channels of exports and imports. In the next chapter, we explain the theoretical framework and methodology for measuring welfare gains as well as the empirical approach to conduct the time series analysis of welfare gains and trade.

CHAPTER 3

THEORETICAL FRAMEWORK AND EMPIRICAL METHODOLOGY

3.1 Introduction

The previous chapter presents an overview of the growth theory and review of relevant studies using various approaches to measure welfare gains of international capital flows across countries. In a related vein, we also review the literature which quantifies welfare gains from free trade. The debate about the measurement of welfare gains starts with Lucas's (1987) influential contribution on *Models of Business Cycles* in which he computes the cost of business cycles for the US economy. Since then, a substantial strand of literature uses the framework developed by him to measure welfare gains in terms of global risk diversification (Table 5). During the past decade, a growing body of literature estimates welfare gains of international capital flows in capital scarce economies using a neoclassical economic model (GJ, Kose et al, 2006; Caselli and Feyrer, 2007, Hoxha et al, 2008). This framework predicts that the distortion induced by capital scarcity is temporary and economy converges towards its steady state level of capital in autarky irrespective of liberalization of capital flows. Subsequent research incorporates elements of endogenous growth into the neoclassical framework which slows down the speed of convergence in autarky (Hoxha et al, 2013). Overall this strand of literature specifies common parameter values from the US economy to compute welfare gains at a point in time. These parameters include time preference rate, capital share in output, depreciation rate of capital and total factor productivity. This chapter explains the theoretical framework and parameters used to construct *time series* of welfare gains from international financial integration. Furthermore, one of the key objectives of the current study is to empirically examine the short-run and long-run causality from trade to welfare gains. This chapter also describes the empirical methodology to investigate the short-run and long-run relationship of welfare gains and trade channels of exports and imports.

This chapter is organized as follows: Section 3.2 presents the framework developed by GJ and extended by Hoxha et al. (2013) to measure welfare gains. It also explains formal derivation of welfare measure and economic intuition behind implied welfare gains from international financial integration. The current study uses country based characteristics to construct time series of welfare gains. It is expressed as a ratio of actual consumption taken as consumption under integration relative to autarky. Section 3.3 explains the approach and arguments used in constructing time series of welfare gains. Section 3.4 describes the estimation and specification of parameters used in welfare calculations. We construct four alternative cases of welfare gains. Section 3.5 covers these cases. Following Prasad et al. (2003), we split the sample of countries into two groups. Section 3.6 sheds light on the sample specification of countries.

We employ the *time series* of welfare gains to examine the casual link between welfare gains and trade. Section 3.7 presents the empirical methodology for time series analysis to examine causal effects. It outlines the steps of evaluating properties of economic time series in the light of unit roots and co-integration tests. Section 3.8 describes the testing procedure of short-run and long-run Granger non-causality. To assess whether the estimation technique yields adequate representation of the data generating process, we conduct multivariate residual diagnostics which are presented in Section 3.9. Section 3.10 summarizes and concludes the chapter.

3.2 Theoretical framework

In the following section, we describe the underlying theoretical assumptions employed by GJ and Hoxha et al. (2013) to compute welfare gains. GJ begins the theoretical analysis with the simple experiment of a small economy and employ neoclassical model of optimal savings to analyze benefits of international capital flows to developing countries.

3.2.1 Gourinchas and Jeanne (2006) Approach

GJ considered a Ramsey-Cass-Koopman (RCK) type of a small economy where saving decision is made by a representative household. It is assumed that the economy accumulates physical capital through two channels which include domestic savings and foreign capital. GJ explain that a small economy relative to other countries means that capital account regime does not affect the world rate of return. RCK neoclassical model employed in GJ is regarded as an important tool to study welfare gains in terms of change in consumption in an economy. It is a representative agent model which optimizes the consumption of households by focusing on their choices over consumption and capital accumulation. This indicates that consumption decision depends on the stock of capital which determines the rate of return on savings. The capital stock in this framework depends on the consumption decision which shows the amount saved by households also depends on the rate of return to savings. Welfare effects of capital across countries occur in two extreme situations. The first situation is characterized as *complete financial autarky*. It represents a situation wherean economy accumulates physical capital through domestic savings of households. In this case, RCK economy behaves as a simple closed economy. The second situation is *perfect financial integration.* It shows free movement of capital across countries at the given world rate of return.[51] This situation qualifies an RCK economy as an open economy. These two cases allow for the comparison of the utility of households in a closed economy relative to an open economy in a neoclassical model of optimal savings.

Furthermore, GJ assume that the world produces one homogeneous product and consists of a number of countries. In this world, a subgroup of small developing countries is faced with the decision of moving from a closed capital account regime to an open economy characterized by the liberalization of capital flows. It is assumed that time is discrete and there exists no uncertainty in economic environment of countries. The population growth rate specific to each developing country is considered exogenous and population of each country is treated as a big family.

Based on the above theoretical assumptions and formulations in GJ, the utility function of each representative and infinitely lived household takes the following form:

$$V = \sum_{s=0}^{\infty} \beta^s N_{t+s} \; u(c_{t+s}) \qquad (3.1)$$

where β is the time discount factor. c_t is consumption per capita at time t, and $u(c_t) = {c_t}^{1-\sigma} / 1 - \sigma$ is constant relative risk averse instantaneous utility function with $\sigma > 0$ indicating relative risk averse preferences. This utility function (3.1) explains that total utility of a representative household is the discounted sum of total utility in the economy. At time t, the population N_t grows at the rate n which is assumed to be exogenous.[52] Alternatively, when GJ assume log preferences, $\sigma = 1$, and the utility function is $u(c, t) = \ln(c_t)$.

The production of output in domestic economy with homogeneous good in GJ framework occurs according to the Cobb-Douglas production function given by:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha} \qquad (3.2)$$

where Y_t denotes the level of domestic output produced, K_t represents stock of domestic capital, L_t is labour supply, and A_t denotes labour augmenting measure of productivity. This constant returns to scale production function exhibits that capital types in it are perfect substitutes. Labour supply in this specification is considered exogenous and proportional to population of

51 Perfect financial integration means perfect capital mobility without any government restrictions on international borrowing and lending. Countries' borrow or lend at the given world interest rate. To start with, GJ make the assumptions of a small economy, complete financial autarky and perfect financial integration for theoretical simplicity in order to establish useful benchmarks for measuring welfare gains. Later on, however, they incorporate more realistic theoretical underpinnings of the growth literature on convergence and productivity growth to estimate welfare gains for a large sample of emerging and developing economies.

52 In equation (3.1), s varies from zero to infinity as a result of which N_{t+s} is reduced to N_t and c_{t+s} to c_t.

a country ($L_t = N_t$). This implies that workers are equal to the population of the country. . GJ's framework assumes that markets for factors of production are perfectly competitive and productivity of the labour increases at a gross rate of $g_t \equiv At/A_{t-1}$. Labour productivity is different across countries in the short run; however, it converges to the same long run value in all economies as t approaches infinity. It means:

$$\lim_{t\to+\infty} g_t = g^* \tag{3.3}$$

where g_t denotes gross rate at which labor productivity grows.[53]

The neoclassical economic model predicts a fast rate of convergence towards the steady state growth path in an autarkic environment. This pathimplies that growth rates of capital, output, and consumption per capita are the same as that of productivity. Given the following Euler equation for consumption

$$u'(c_t) = \beta R_{t+1} u'(c_{t+1}), \tag{3.4}$$

the Euler equation for consumption with technology growth in GJ framework can be written as follows:

$$\hat{c}_{t+1} = \hat{c}_t \frac{(\beta R_{t+1})^{1/\sigma}}{1+\mathrm{g}} \tag{3.5}$$

In the above equation, $\hat{c}_t$ shows consumption in current period, $\hat{c}_{t+1}$ denotes consumption in the next period, R_{t+1} indicates the return on a unit capital also described as the marginal product of capital across two time periods t and $t+1$. g indicates the growth rate of technology and σ is the coefficient of risk aversion. [54] An important characteristic of the above Euler equation shows that the economy discounts future consumption with time discount factor (β) as well as growth rate of technology (g). This means that higher technological growth encourages current consumption more than future consumption. However, the economy still enjoys enormous future consumption as growth rate of technology does not require households to save more for future. On the other, the Euler equation without technological growth (3.4) only discounts consumption with the time discount factor (β).

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53 According to GJ it is a common assumption included in the empirical growth literature. GJ define g as the rate at which labour productivity grows and explain it as the growth rate of productivity. Hoxha et al. (2013) also mention about it as the growth rate of technology. Growth literature commonly makes use of the above assumption of a constant and common growth rate (Mankiw et al, 1992). It shows improvement in the state of knowledge and technology in the world. It benefits all economies in the long-run. The rationale behind this assumption is that if productivity growth does not remain constant over the long-run, world income distribution expands and increases to infinite levels.

54 We provide the details of this derivation adopted from GJ and Hoxha et al. (2013) in Appendix 2. The main difference between c_t and $\hat{c}_t$ is that former is simply utility of consumption in time period t while the latter is assumed to be normalized with productivity and population. Hoxha et al. (2008) mention that productivity and population normalized variables are denoted with the hat, $\hat{x}_t = \frac{x_t}{A_t N_t}$. In addition, g enters in the Euler equation (3.5) when the production function incorporates technological change and explains the growth of productivity.

Financial autarky requires that each economy accumulates physical capital only by utilizing domestic savings of households. Financial integration, on the other hand, enables domestic agents to lend or borrow at the world rate of interest. The rest of the world comprises developed countries and have already reached steady state growth paths. This assumption makes the domestic interest rate equal to the world rate. As a result, domestic per capita consumption grows at the rate of long-run productivity growth. Welfare gains are expressed in terms of domestic consumption and are defined by GJ as percentage increase in the country's consumption that brings domestic welfare under autarky up to the level of welfare when a country financially integrates.

3.2.2 Hoxha et al. (2013) Approach

Hoxha et al. (2013) maintain the optimization framework of GJ explained in equation (3.1). They, however, deviate from the constant returns to scale production function and develop a model with capital varieties as imperfect substitutes. They borrow this production structure from Broda et al. (2006) who explain that consumption goods are considered as imperfect substitutes. It is observed when they investigate the impact of product variety in the context of trade and growth. Hoxha et al. (213) depart from the standard neo-classical production function and assume that the value substitution parameter $\in$ is less than one but greater than capital share in output such that $\alpha < \in \leq 1$. This production technology shows that the economy produces the final good by using labour and intermediate goods (also referred to as different capital varieties). In essence, this production function explains varieties of intermediate goods in terms of different capital types.[55] Given the above theoretical assumptions, the production function employed by Hoxha et al. (2013) takes the following form [56]:

$$Y_t = (A_t L_t)^{1-\alpha} \left(\sum_{i=0}^{M_t} X_{it}{}^{\epsilon} \right)^{\frac{\alpha}{\epsilon}} \qquad (3.6)$$

Equation (3.6) shows that economy produces the final output Y_t using labour and M different capital varieties of intermediate goods denoted by X_i at time t. A_t denotes labour augmenting measure of productivity. L_t denotes labor supply. Labour receives the share $1 - \alpha$ of output from the economy, while different forms of capital varieties regarded as imperfect substitutes

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55 Romer (1990) develops his endogenous growth model with the same argument. He explicitly states that varieties of intermediate goods are in fact different types of capital. Furthermore, Hoxha et al. (2013) assume that each capital variety is produced by a single producer under monopolistic competition. Each monopolistically competitive firm is assumed to take the aggregate supply of capital goods as given. Finally, this assumption also makes each firm identical to each other which produce each variety of capital in exactly similar proportions. This assumption allows them to use alternative values of the substitution parameter ϵ to calibrate welfare gains.

56 Hoxha et al. (2013) borrow this production structure from Broda et al (2006).

get the share α. ϵ is the coefficient of production function for capital types. Given the productivity and population normalized variables, the dynamic budget constraint for each economy in Hoxha et al. (2013) takes the following form:

$$\hat{k}_{t+1}(1+n)(1+g) = \hat{k}_t(1-\delta) + \hat{y}_t - \hat{c}_t \qquad (3.7)$$

In the above budget constraint, δ is the depreciate rate, n is the population growth rate, g indicates the rate of technological progress in the economy. [57] The terms in hat show that a variable expressed in per efficiency unit terms. The dynamic budget constraint is based on the assumption that capital and assets are equal to each other in the financial sector. [58] Hoxha et al. (2013) obtain similar form of the Euler equation (3.5) using the Ramsey model with technological growth from utility maximization problem written as follows:[59]

$$\hat{c}_{t+1} = \hat{c}_t \frac{(\beta R_{t+1})^{\frac{1}{\sigma}}}{1+g}$$

However, the difference between the GJ and Hoxha et al. (2013) approaches lies in the calculation of the rate of return to unit capital which, in turn, depends on the sensitivity of the marginal product of any single type of capital to aggregate capital stock in the economy. In GJ, it is implicitly assumed that capital varieties are perfect substitutes which implies that $\epsilon = 1$. Hoxha et al. (2013), on the other hand, assume that capital varieties are imperfect substitutes which implies that capital varieties are not infinitely substitutable and measure welfare gains with exogenously varying values of ϵ.

3.2.3 A formal measure of welfare gains

GJ derive a formal measure of welfare gains to explain the economic intuition behind implied welfare gains from international financial integration. It is based on the return differential between a country's rate of return in autarky and all other countries in the world multiplied by amount of capital inflows $(R_{t+1} - R^w)d\mathbb{K}_{t+1}$. They develop this measure of welfare gains in order to make a comparative analysis of utility under autarky relative to integration. The utility under autarky considers consumption of a country in the absence of complete capital inflows. This represents a closed economy situation. An economy receives benefits of increase in

57 This budget constraint is taken from Hoxha et al. (2013). Hoxha et al. (2010) also provide an alternative simplified form of the budget constraint which we have used in the Appendix 2 to derive the Euler equation.
58 In a closed economy, total assets owned by the residents of a country are equal to the amount of physical stock of capital. However, this equality does not hold in case of open economy when foreign capital enters the economy upon liberalization. Since it is also assumed that there is no cost attached to the international financial sector, as capital flows across countries, the financial sector ensures that capital and assets are equal to each other.
59 The details of its derivation adopted from (Hoxha et al, 2013) are provided in Appendix 2.

consumption when capital moves freely without any restrictions across countries. This reflects the characteristics of an open economy. GJ further assume that the central planner of a capital scarce economy starts the process of financial integration by removing capital control measures.

GJ further define and denote marginal amount of foreign capital authorized by the government of a capital scarce country through capital account liberalization as $d\mathbb{K}_{t+1}$ at time t. They assume that this policy change marginally increases financial integration and contributes to enhancing foreign capital in the domestic economy. As capital accumulates the rate of return on the domestic savings falls. However, the equilibrium real wage goes up. The domestic income of this capital scarce economy marginally goes up by the amount $d\mathbb{K}_{t+1}R_{t+1}$. In this expression, R_{t+1}, is defined as the marginal product of capital taken as the rate of return on foreign capital. The owners of foreign capital receive a rate of return on their investments. It is referred to as the world rate of return R^w. Thus the marginal increase in the domestic income is defined as $dy_{t+1} - R^w d\mathbb{K}_{t+1} = (R_{t+1} - R^w)d\mathbb{K}_{t+1}$.

The welfare gain of this increase in domestic income is defined as:

$$dV_{t+1} = v'(c_{t+1})(R_{t+1} - R^w)d\mathbb{K}_{t+1} \tag{3.8}$$

In the above equation $v'(c_{t+1})$ is the marginal utility of consumption in period $t + 1$. GJ show that with log utility assumption u(c_t) = ln(c_t), the expression for the welfare gain in period $t + 1$ can be written as:

$$dV_{t+1} = \frac{1}{c_{t+1}}(R_{t+1} - R^w)d\mathbb{K}_{t+1} \tag{3.9}$$

It can be further simplified as:

$$dV_{t+1} = (R_{t+1} - R^w)\frac{d\mathbb{K}_{t+1}}{c_{t+1}} \tag{3.10}$$

$$dV_{t+1} = (R_{t+1} - R^w)\overline{\kappa} \tag{3.11}$$

Where $\overline{\kappa} = \frac{d\mathbb{K}_{t+1}}{c_{t+1}}$. It is defined as the ratio of capital flows to current consumption in an economy.

Starting from the initial period, the social planner continues to pursue process of financial integration for all subsequent periods. If the ratio of capital flows to current consumption remains constant in every subsequent period when capital moves freely, the welfare gains of capital flows in terms of discounted utility can be written as:

$$dV = \sum_{t=0}^{\infty} \beta^t (R_{t+1} - R^w)\overline{\kappa} \tag{3.12}$$

GJ define it as the percentage increase in the country's consumption that brings domestic welfare in the economy under conditions of autarky up to the level of domestic welfare under integration. With log preferences, the welfare gain captured by the Hicksian equivalent variation μ is described by the following equation.

$$dV = \sum_{t=0}^{\infty} \beta^t \, ln(1+\mu) \qquad (3.13)$$

Assuming that μ is relatively small, then $ln(1+\mu) \approx \mu$, the equation (3.13) can be written as:

$$dV = \sum_{t=0}^{\infty} \beta^t \; \mu \qquad (3.14)$$

Expanding equation (3.14) and using the argument of $\frac{1}{1-\beta}\mu$ for equation (3.14) and solving (3.12) and (3.14) together,

$$\mu \approx (1-\beta)\sum_{t=0}^{\infty} \beta^t \,(R_{t+1} - R^w)\overline{\kappa} \qquad (3.15)$$

The above expression can be simplified further as:

$$\mu \approx \left(\widehat{R} - R^w\right)\overline{\kappa} \qquad (3.16)$$

where $\widehat{R} = (1-\beta)\sum_0^{\infty} \beta^t \, R_{t+1}$.

$\widehat{R}$ denotes discounted value of the domestic rate of return if a country were to be completely autarkic. GJ call it the permanent value of the domestic interest rate. Hoxha et al. (2010), however, explain that it is not only the current differential in rates of return which is important in analyzing the welfare impact of integration but the time path of rates of return in an autarkic environment is equally significant for determining welfare gains. In addition, an important point to note in the above expression (3.15) of welfare gain is that, welfare calculation does not depend on time path of $\widehat{R}$. It means that no optimization condition is required to be met to obtain this welfare measure. The estimate thus obtained through this method provides an assessment of the size of welfare gains from financial integration. It shows the differential of the domestic rates of return in autarky relative to the world rate of return.

3.3 Time series of welfare gains

One of the key objectives of the current study is to construct time series of welfare gains within emerging and developing economies over time. It employs the framework developed by GJ and extended by Hoxha et al. (2013) to measure country-specific welfare gains. In this version of neoclassical framework, welfare gains are measured at a point in time. We contribute in the literature by measuring time-varying welfare gains using country-specific macroeconomic characteristics to seek more insights regarding welfare patterns within economies over time. We measure welfare gains as a ratio of consumption under integration relative to autarky. We assume consumption under integration as the actual domestic consumption per capita of emerging and developing economies.[60] We obtain time series of consumption under autarky by calibrating the RCK neoclassical model of optimal savings.[61] The implied welfare gains are expressed in terms of equivalent variation, μ, which encapsulates the welfare differences between actual consumptionand autarky consumption. It reflects a country's consumption that brings welfare improvement under autarky relative to the level of actual welfare under integration. [62]

$$\mu = \left(\frac{C^{int}}{C^{aut}}\right) \tag{3.17}$$

C^{int} denotes actually observed path of consumption. C^{aut} indicates consumption under autarky. [63] We derive it from the model developed by GJ using the Euler equation (3.5) for consumption under financial autarky.

Following Hoxha et al. (2010), we consider that the assumption of the RCK model is convenient and useful to explain autarky path of consumption. In this model, it is assumed that capital stock depends entirely on domestic savings. While we construct the *time series* of welfare gains based on this framework, we also use additional arguments of the relevant growth literature to support it.. We measure consumption under autarky from the Euler equation (3.5) because there is no simple analytical or closed form solution for it.[64] This equation results from the closed neoclassical optimal savings model explained in the theoretical framework. It is assumed that each country follows equation (3.5) under conditions of autarky which implies that level of autarky consumption can be computed for each year from 1961-2010. It reflects the level of consumption of a developing economy regulated by capital account restrictions.

GJ assume that domestic households choose how to allocate wealth internationally from time 0 to determine consumption under integration. The representative household lends and borrow at the world rate of return under financial integration. The infusion of foreign capital

60 We follow Hoxha et al. (2008) who take actual consumption for countries as the observed level of consumption.
61 Hoxha et al. (2008) calibrate neoclassical savings model with common and constant parameter values which determine autarky consumption. We use country-specific parameter values to calibrate the neoclassical model of optimal savings to determine autarky consumption.
62 GJ and Hoxha et al. (2013) compute welfare gains in terms of equivalent variation defined in terms of percentage increase. As we are also interested in using this welfare measure in examining the short run and long run relationship with trade channels, we define it as a ratio of actual consumption termed as consumption under integration relative to autarky. Growth in terms of percent change may not properly account for long relationship of variables.
63 We use the terms *actual* level of consumption or *observed* level of consumption throughout this study as consumption under integration.
64 Autarky consumption does not have simple analytical solution. GJ and Hoxha et al. (2013) compute consumption under autarky by numerically solving for the saddle- point stable equilibrium. As we are constructing time series of welfare gains, we compute consumption under autarky from the Euler equation (3.5). In autarky, the optimal consumption path depends on the rate of return which in turn, depends on consumption behavior of households. We consider that the Euler equation (3.5) also account for both these points.

from developed economies which have already reached steady state levels into the developing economy equates the its rate of return to the world rate. With these assumptions, the Euler equation under financial integration implies that domestic per capita consumption grows at the rate g in each period following integration.[65] We use actual data on consumption as we are interested in measuring and analyzing the patterns of welfare gains practically experienced by emerging and developing economies over the period 1961-2010 instead of focusing on the potential gains from international financial integration. This framework postulates that welfare gains occur if the level of consumption under integration exceeds the consumption relative to autarky in a developing country.

In order to construct time series of welfare gains it is also important to think about two key issues: the steady state rate of return on domestic savings and productivity growth in the long-run. The assumption of steady state return to capital in GJ requires that capital and output per capita do not change in autarky and integration conditions in the long-run. They, however, recognize that differences in capital and output per capita across countries are independent of liberalization of capital flows. In fact, they state "the effect of integration is to accelerate the country's convergence towards the steady growth path that is the same under autarky".

This assumption of steady state rate of return in GJ framework is consistent with models of balanced growth based on Kaldor facts. These facts illustrate that output per worker, the capital labour ratio, the real return on capital, and shares of labour and capital in income remain constant over time. There are, however, systematic and structural changes which occur in various sectors of the economy and affect macroeconomic conditions (Chenery, 1960; Kuznets, 1973; Kongsamut, Rebelo, and Xie, 2001). These changes show that shares of labour and capital in income are not constant over time because of reallocation of labour across different economic sectors (Ngai and Pissarides, 2007). This argument is is consistent with studies of growth models accounting for non-balanced economic growth (Matsuyama, 1992; Caselli and Coleman, 2001; Gollin et al, 2002; Hall and Jones, 2007). Moreover, Acemoglu and Guerrieri (2008) demonstrate that factor proportion differences across economic sectors result in non-balanced growth without fundamentally altering its long-run properties. A recent study by Papell and Prodan (2014) empirically examines the presence of balanced growth paths in many OECD and Asian economies. Out of a sample of 26 economies, only two economies of Canada and USA follow a strict balanced growth path. They observe an unambiguous change in the

65 GJ also provide Euler equation under financial integration which incorporates steady state rate of return and growth rate of per capita consumption when a country financial integrates.

level of GDP per capita which indicate that these economies do not strictly follow balanced growth path.

Given the background of literature related to balanced and non-balanced economic growth, the essential idea of the current study is that while we consider Kaldor facts are well established, we are also interested in analyzing the implications of structural changes which occur in a developing economy from time to time. The assumption of constant capital share which affects the steady state level of capital, capital output ratios and rate of return to capital across all countries may not truly capture welfare gains ofinternational capital flows. GJ also explain that the assumption of constant labour share across economies is “certainly too strong”. In addition, Kose et al. (2006) also highlight certain potential collateral benefits for developing countries which are not restricted to just capital flows but “What comes along with capital flows”. These collateral benefits occur over a period of time. According to Hoxha et al. (2009), GJ compute welfare gains using observed data in the year 1995 to establish initial values. They contend similar calculations can be conducted for different years and find that countries may not converge as rapidly as predicted in the neoclassical economic model employed by GJ in 2006.

Furthermore, growth literature commonly makes use of the assumption of a constant and common productivity growth rate (Kaldor, 1957; Uzawa, 1961). The growth rate of productivity shows improvement in the state of knowledge and technology and benefits all economies in the long-run.[66] However, in reality productivity growth rates vary across countries in different time periods. According to Mankiw et al. (1992), differences in productivity growth rates occur not only because of improvement in state of technology and human capital, but other factors such as resource endowments, climate and institutions also contribute to the growth of productivity. The success stories of some Asian economies in the post-world war II period also support this contention (Rodrik, 1995).

We measure welfare gains and consider these factors by incorporating country-specific parameter values which may create differences in domestic rate of interest across countries, have an impact on the growth of autarky consumption and affect welfare calculations. In order to better capture the impact of international capital mobility over time, the current study, therefore, constructs time series of consumption under autarky to compute time series of welfare gains for the years 1961-2010. Previous studies on welfare gains and international

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66 The rationale behind this assumption is that if productivity growth does not remain constant over the long run, world income distribution expands and increases to infinite levels. As a result, the fastest growing economy in the world grows rapidly and produces more than global level of production.

capital flows do not account for these systematic and structural changes which occur in economies from time to time. This exercise will yield additional insights regarding welfare gains in emerging and developing economies as people continuously update their expectations based on both short-run and long-run growth patterns consistent with models of balanced and non-balanced economic growth.

Additionally, financial integration leads to heterogeneous effects which depend on the amount of risk, size of economies as well as their initial level of capital scarcity (Coeurdacier et al, 2013). This indicates that the size of the economy is an important factor in measuring welfare gains. A small economy does not affect the world rate of return, an assumption made by GJ in 2006. Coeurdacier et al. (2013), however, calibrated welfare gains for big emerging markets and small size economies. They assume that a small economy is ten times less productive than a large emerging economy. Following Coeurdacier et al. (2013), we believe that market size matters as economies grow and make advancements in technology over time. GJ also point out that their simple experiment exercise which assumes RCK type of a small economy is aimed at maintaining theoretical simplicity to establish benchmark welfare estimates. In order to measure welfare gains in a realistic manner, they argue, it is important to account for similar recent developments of growth and integration literature. We construct time series of country-specific welfare gains which may provide more intuition and insight about heterogeneous effects of financial integration.

Finally, the neoclassical model predicts that flow of resources through international capital mobility to a developing country causes short-run changes in the investment and growth patterns which contribute to the permanent improvement in the standards of living individuals. Empirical studiesregarding cross country regression frameworks in the previous chapter fail to find robust evidence of integration on growth because these studies aim at testing permanent growth effects of liberalization. Henry (2007) points that cross country regression framework is not an appropriate procedure to analyze growth effects because capital accumulation process is subject to diminishing returns in the neoclassical economic model. Therefore, it is, important to investigate time series perspective of welfare gains from international financial integration as countries' consumption profiles change in response to capital account liberalization.

This studyconstructs time series of welfare gains to further explain the consumption effect of international financial integration expressed in terms of equivalent variation by comparing consumption under integration relative to autarky. We use the framework developed by GJ to measure welfare gains based on RCK neoclassical growth models. They provide benchmark estimates on the basis of assumption of perfect financial integration and autarky and assume these states of the economy for theoretical simplicity. However, we are not interested in these extreme assumptions to examine the role of international financial integration in measuring welfare gains. We use their framework and focus on measuring welfare gains of international capital flows in emerging and developing economies for the period 1961-2010. The neoclassical model predicts fast convergence towards balanced growth path in autarky in which capital, output and consumption grows approximately at the same speed to that of productivity. Based on this argument, GJ assume domestic rates of return among countries converge to the world rate very rapidly and cause welfare gains to diminish over time. Following Hoxha et al. (2008), we do not assume convergence across countries and consider that differential in the rate of return persists across countries and over time. This allows for the construction of time series of welfare gains for the years 1961-2010 because differences in the rates of return for long period of time encourage international capital flows to continually move to most developing and emerging economies. Given this time series perspective, the next section focuses on the parameters in measuring welfare gains within economies over time.

3.4. Estimation and specification of parameters

We compute welfare gains by using equation (3.17). We use data on actual consumption as consumption under integration and compute time series of consumption under autarky from equation (3.5). We employ the extracted and estimated values of parameters to compute consumption under autarky and then measure welfare gains. The current study estimates the time preference rate (β), and extracts country-specific estimated values of other parameters from PWT version 8. It is more relevant for the current study because it provides information about time series of structural parameters used in measuring welfare gains. [67] It documents and provides time series of measures such as country-specific labour share in GDP, depreciation rates, and total factor productivity. We are interested in using these measures to obtain more insights and intuition about welfare effects of international financial integration over time. Equations (3.5) and (3.17) explain these parameters and show how computation of welfare gains depend on them.

67 From GJ to Hoxha et al. (2013) studies measuring welfare gains using neoclassical economic model mostly use PWT 6.0 or 6.1. PWT version 8.0 was released in 2013. Inklaar and Timmer (2013) also explain that though PWT has long been a source of choice for measures related to macroeconomic growth but version 8.0 provides more comprehensive information about relative levels of income, inputs, and productivity across countries and over time which was not available in previous versions.

3.4.1 Estimation of time preference rate $(\boldsymbol{\beta})$

The first parameter is time preference rate whichcaptures impatience of domestic agents in an economy. It affects household consumption and saving patterns which constitute large part of national income of countries. The current study measures welfare gains with three different values of time preference rates to check the robustness of welfare measure. First it uses the fixed value of 0.96 which is the time preference rate from the US economy.[68] The use of the fixed value of the time preference rate assumes that people are equally patient across different countries. Secondly, we calculate time preference rate in terms of time discount factor from real interest data for the sample of countries included in the study. Finally, we estimate time preference rate by regressing current consumption on its lagged value and current income for the period 1960-2010. This enables us to examine the sensitivity of this parameter in determining welfare gains of international capital flows.

In the second approach, we use average value of real interest rates to calculate time discount factor for welfare calculations.[69] It relates to equilibrium interest rate in the economy because itis also referred to as the market time discount rate. We calculate it in the following way:

$$\beta = \frac{1}{(1+r)} \tag{3.18}$$

The above equation shows that beta β is the discount factor and r is the real interest rate in the economy. Fisher (1930) defines it in terms of marginal rate of substitution between current and future consumption.[70] Put differently, the term $(1 + r)$ shows the relative cost of current consumption in period 1 in terms of future consumption in period 2. Fisher's model is one of the easiest ways of describing the saving decisions of the households. He highlights two key features of time preference which are crucial in the analysis of saving and investment behaviour and economic growth. First, the relative consumption levels of people determine their degree of impatience in terms of current and future consumption. Secondly, present and future consumption requirements of the people need not be valued equally. This shows that consumption behaviour and peoples' preferences are not uniform across countries. We obtain data on the real interest rates from the World Development Indicators (WDI) which defines it

68 GJ use the value 0.96. Hoxha et al. (2013), on the other hand, calibrate the welfare gains by using 0.96 as well as a lower value 0.93. However, it is arbitrary without any reference for country-specific characteristics.
69 This average is derived from real interest rates data obtained from World Development Indicators. This data is not available for all fifty years for all countries. So, we take the average of available data on real interest rates.
70 Historically Böhm-Bawerk (1891) was the first who emphasized the idea of time preference rate in terms of current consumption over future consumption.

as the lending interest rate adjusted for inflation as measured by the GDP deflator of each country.

Finally, we estimate time preference rate by regressing current consumption on lagged consumption and current income. Hall (1978) explains that consumers form long-run expectations of consumption and set current level of consumption as a fraction of these expectations. Hall's Random Walk hypothesis shows changes in consumption are not predictable. Moreover, Campbell and Mankiw (1989) show that current income also affects consumption and formulate a specific alternative hypothesis. According to them consumers obey the rule of "rule of thumb" of consuming their current income rather than their permanent income. In addition, Carroll and summers (1991) observe consumption and income move closely in the long-run.

Given the background of this literature, we estimate the following equation in order to obtain time preference rate:

$$c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 Y_t + e_t \qquad (3.19)$$

Equation (3.19) shows lagged value of consumption and current income determines current consumption. c_t is consumption per capita in period t, c_{t-1} at $t-1$, Y_t is current income, and e_t is the stochastic error term. We estimate this equation for each country for the period 1960-2010 using the two stage least squares (2SLS) approach assuming endogeneity of current income with current consumption.[71] Following Campbell and Mankiw (1991) we employ instrumental variable approach (IV) and use lagged values of income as instruments to deal with the problem of endogeneity.[72] Finally, in order to account for structural changes or breaks which may occur in a given country over the period 1961-2010, we introduce dummy variables and time trend in equation (3.19).[73]

71 We are using 2SLS to extract the value of the time preference rate (β) which is used to measure country-specific welfare gains. There are alternative empirical applications such as Generalized Method of Moments (GMM) which may be adopted in future research to address issues related to the validity of instruments. However, GMM will be 2SLS under standard moment conditions.

72 Mankiw and Campbell (1991) extend and simplify Flavin's (1981) model on the adjustment of consumption to changing expectations about future income. This model relates change in consumption with change in current income as well as lagged income.

73 It is important to mention that there is a range of consumption models which are discussed in macroeconomics literature and complete description of these models is beyond the scope of this study. Our focus is to estimate the coefficient of the lagged consumption as patience parameter using equation (3.19) and use it in equation (3.5) to compute consumption under autarky to determine welfare gains. The main reason of using data on actual consumption to estimate time preference rate is that we follow Hoxha et al. (2008) and assume that the autarky path of each country obeys the Euler equation (3.5). In a Ramsay model, consumption under autarky does not have a final expression. In autarky, the optimal path for consumption depends on R, and R depends on consumption behavior. We require the value of the patience parameter even if we compute consumption under autarky by numerical method. Therefore, it is perhaps not possible to estimate time preference parameter using data on autarky consumption. Extending this argument, we consider that because of these theoretical limitations

3.4.2 Capital's share(α)

We extract implied capital's share in output from the labour share provided in PWT version 8. It estimates share of labour income in GDP of each country. Inklaar and Timmer (2013) construct the "best estimate" of labour share in PWT.8 based on various adjustments and extends the earlier work of Gollin (2002) of getting income shares right. Gollin finds that the estimation of labour share in income is problematic because income of workers who are self-employed cannot be determined similar to income of workers who are employed. Self-employed individuals constitute a sizeable component of the labour force and it is therefore important to account for non-wage compensation in the measure of labour income. Therefore, heestimates labour shares on the basis of three adjustments. The first adjustment assumes that self-employed workers in the economy use only one factor of production which is labour. It allocates all mixed income to the labour force in the economy.[74] The second adjustment assumes that self-employed earning individuals employ same proportion of factor of production being used by other segments of the labour force. The last adjustment explains that there is no difference in the expected wage of employees and self-employed workers.

The incorporation of additional adjustment by Inklaar and Timmer (2013) about the share of agriculture in an economy in the PWT 8 makes it more recent and reliable. This adjustment accounts for all value added in the agricultural sector and include in it labour compensation of employees. Value added in agriculture in employees' income shows that the majority of the self-employed workers in the less developed countries come from agriculture sector. Labour force in agriculture constitutes about half of self-employed workers in low income countries (Inklaar and Timmer, 2013). The existing literature estimates the expected value of labour share in agricultural sector to be more than 90% of the value added (Timmer, 2012).[75] Inklaar and Timmer (2013) describe adjusted labour share as the best estimate of labour share in income.

We use labour share estimated by (Inklaar and Timmer, 2013) to derive implied capital share in welfare calculations. Ngai and Pissarides (2007) show that structural change in various sectors of the economy is reflected in the changing labour shares overtime. We employ the

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of the Ramsay model, it is perhaps difficult to estimate autarky parameters which can used to compute autarky consumption. We, therefore, also assume that though the parameters extracted from the PWT are estimated using actual data, the economy of each developing country is still obeying the Euler equation (3.5) following Hoxha et al. (2008) for measuring consumption under autarky.

74 Mixed income is defined in PWT 8 as the total income earned by the segment of the labor force considered as self-employed. It comprises both capital and labor income.

75 See also Socio-Economic Accounts (SEA) of the World Input Output Database.

capital share in measuring welfare gains to properly account for structural changes which may occur over time to match the actual experience of an economy in question.

3.4.3 Depreciation of capital stock $(\boldsymbol{\delta})$

We obtain depreciation rate of capital stock from PWT version 8 similar to capital's share in output. Previous literature on welfare gains uses depreciation rate of capital stock of 6% again with reference to the US economy (GJ and Hoxha et al, 2013). However, Inklaar and Timmer (2013) explain that components of investment differ across countries and over time. Therefore, it is unrealistic to continuously assume that all countries have the same depreciation rate for all years. [76] This argument allows for the use of time-varying depreciation rates in welfare calculations.

3.4.4 Total factor productivity growth $(\boldsymbol{g})$

In order to measure welfare gains, we also need to specify total factor productivity growth (TFP). Previous studies consider growth rate of TFP similar to the long-run U.S values (GJ and Hoxha et al, 2013). An important characteristic of Euler equation (3.5) in autarky shows that the economy discounts consumption with discount factor as well as productivity growth rate. In reality, this productivity growth rate differs between rich and poor countries. Moreover, Hall and Jones (1999) highlight the role of "social infrastructure" to explain productivity differences across countries. This term reflects the quality of institutions and government policies which determines economic environment of a country. The assumption of homogeneous economic environment which the literature adopts for capital accumulation, skill formation and production of output is a strong assumption (Gourinchas and Jeanne, 2003).

In this study we compute time-varying welfare gains for the period 1961-2010 with different levels of productivity over time time instead of calculating welfare gains from steady state productivity growth. Following Hoxha et al. (2008), we do not assume any convergence in growth rates of productivity as we use data from 1961 to 2010 which can be considered a limited time period. Furthermore, following Feenstra et al. (2015) we choose (TFP) growth to highlight technological differences within countries over time. PWT 8 provides a more reliable

76 Inklaar and Timmer (2013) calculate depreciation rate of the total capital stock as follows: $\delta_{it} = \sum_a P_{ait}\ \delta_a K_{ait}$ Where δ_{it} shows the depreciation rate of country i in period t while P_{ait} shows the assets deflator for an asset a of country i in period t. K_{ait} indicates the capitals stock computed for a country i for an asset a in period t using the perpetual inventory method (Inklaar and Timmer, 2013).

and appropriate measure of TFP growth figures which are obtained by deflating the observed difference in real gross domestic product by the Tornqvist index of factor endowments. [77]

Finally, in this study we assume $\sigma = 1$. In such a situation, we represent the utility function $u(c,t) = \ln(c_t)$ which indicates log preferences. Consumption theory assumes log utility for convenience and simplicity.[78] Based on these parameter choices, we measure welfare gains expressed as a ratio of consumption under integration (actual current consumption) relative to (derived) autarky consumption. The data on consumption per capita is taken from the (PWT) 8.

3.5 Multiple series of welfare gains

We use equation (3.17) to compute and construct time series of welfare gains after estimating and specifying parameters choices under four different cases.

3.5.1 Case 1: Computation of time-varying welfare gains with given time preference rate $(\boldsymbol{\beta})$

In the first case, we construct time series of welfare gains using the framework developed by GJ in the light of neoclassical economic model. In this framework, we use constant returns to scale production function and assume that capital varieties are infinitely substitutable to derive autarky level of consumption. We further specify country-specific parameters values of capital's share in output, depreciation rates and TFP growth. However, we consider fixed time preference rate of 0.96 similar to the US economy.[79]

3.5.2 Case 2: Computation of time-varying welfare gains with time preference rate $(\boldsymbol{\beta})$ based on real interest rates

In the second case, we continue with the framework developed by GJ in the light of theoretical formulations of neoclassical economic model and compute welfare gains through derived

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77 The Tornqvist index indicates that reference prices for goods entail prices of factors of production. TFP growth is computed by using constant price real GDP growth rates of each country.

$$RTFP_{j,t,t-1}^{NA} \equiv \frac{RGDP_{jt}^{NA}}{RGDP_{jt-1}^{NA}} / Q_t\left(v_{jt,} v_{jt-1,} w_{jt,} w_{jt-1}\right)$$

In the above equation, $RTFP$ shows (TFP) at constant national prices at 2005 for country j between the period $t-1$ and t. $RGDP$ denotes real GDP at constant 2005 national prices for country j in period t and $t-1$. Q_t is Tornqvist index which explains factor endowments and factor prices. It shows v as factor endowments and w as factor prices for country j in period t and $t-1$.

78 The choice of log utility is particularly convenient as the income and substitution effects cancel each other out. Therefore, this is the only parameter which is considered fixed in welfare calculations. Though β which is time preference rate is also fixed, we use three different value of β in welfare calculations. Thus these two parameters do not vary with time. Hoxha et al. (2009) has however calculated this parameter over time and backed out the value of time preference rate from Euler equation (3.5) but they also use its average value.

79 We keep it fixed in the first scenario as we also use both the calculated and estimated value of this parameter in subsequent welfare calculations.

autarky level of consumption by using country-specific discount factor calculated from real interest rates. This is calculated using equation (3.18).

3.5.3 Case 3: Computation of time-varying welfare gains with estimated time preference rate ($\boldsymbol{\beta}$)

In the third case, we calculate welfare gains by using the estimated value of time preference rate for each country. We estimate equation (3.18) through 2 SLS approach in order to obtain the value of the coefficient of lagged consumption which is termed as the time preference rate (β).

3.5.4 Case 4: Computation of time-varying welfare gains with capital varieties as imperfect substitutes

In this case, we use the framework provided by Hoxha et al. (2013) which integrates elements of endogenous growth into the neo-classical economic model. GJ implicitly assume that capital stock is equal to the sum of capital types which are perfectly or infinitely substitutable. In such a situation, it is implicitly assumed that the value of substitution parameter $\epsilon = 1$ and the value of elasticity of substitution is infinite consistent with the standard neo-classical model. Hoxha et al. (2013), on the other hand, consider that capital varieties are not infinitely substitutable. As a result the value of substitution parameter is $\alpha < \epsilon \leq 1$ and the value of the elasticity of substitution falls below infinity. α is the share of capital in output and ϵ is the coefficient of the CES production function (3.6) for capital types based on Broda et al. (2006). The use of this assumption distinguishes between share of capital in output and elasticity of capital in output. In standard neo-classical setting employed by GJ, share of capital in output and elasticity of capital in output are equal to each other. Hoxha et al. (2013) explain that when capital varieties are not infinitely substitutable as in equation (3.6), share of capital in output and elasticity of capital in output are not equal to each other as the link between the two is broken.

We follow Hoxha et al. (2013) and consider α/ϵ as the coefficient on capital in the aggregated production function. In such a situation, the rate of return to capital will be different from the standard neoclassical settings. The central planner observes the rate of return being equal to α/ϵ times $\frac{Y_t}{K_t}$ instead of α times $\frac{Y_t}{K_t}$ as is predicted in the neoclassical economic model.[80] Hoxha et al. (2013) mention about it but measure welfare gains by separating capital's share in output and elasticity of output with respect to capital. However, they also assume that

80 The details of the derivations of the marginal product of capital or the return on the unit capital net of depreciation are provided in the Appendix 2.

monopolistically competitive firms behave as identical producers and consider the given total stock of capital in their optimizing decisions. The implication of this assumption is that each firm produces a constant amount of each capital variety allowing capital used of each type to grow along with productivity and population over time. We, therefore, measure another time series of welfare gains without separating this link and assume the rate of return being equal to α/ϵ times $\frac{Y_t}{K_t}$ as is observed by the central planner.

Hoxha et al. (2013) use simulations with five different values of this substitution parameter ranging from 0.45 to 1. This study uses intermediate value of 0.6 in order to measure welfare gains.[81] The rationale of taking this intermediate value is that it is higher than the capital share in output for most emerging and developing economies. This is also perhaps more consistent with Broda et al (2006) estimates of elasticities of substitution for capital varieties. They obtain values of elasticity of substitution of 2.3 for the US economy. [82] It is important to investigate this issue because gains which result from borrowing in international financial markets change with different values of ϵ which is the coefficient of the CES production function for capital types. We discuss the results of main parameters of welfare calculations and time series of welfare gains in MFI and LFI economies in Chapter 4. In addition, we provide detailed discussion of welfare experiences of selected countries from various regions in Chapter 5.

3.6 Sample specification of countries:

We see that studies analyzing the size of welfare effects report wide differences in results. Since time to initiate policies of capital account liberalization and current state of financial integration varies across countries, we split the sample of countries into two groups following the classification based on Prasad et al. (2003). This approach (Prasad et al; 2003) takes into account *de facto* average measure of financial openness based on actual capital flows measured as ratios of gross stocks of foreign assets and liabilities to GDP over forty years between 1960-1999. The first group is called MFIs and second group is called LFIs. MFIs constitute a group of 22 emerging market economies and LFIs consist of 33 developing countries.[83]

81 Hoxha et al. (2013) use five different values of ϵ which are 0.75, 0.67,0.6, 0.5,0.45 other than 1 which is implicitly assumed in the neoclassical growth model.

82 The median value of substitution parameter ϵ equal to 0.6 implies a elasticity of substitution of 2.5. Though Broda et al (2006) estimates are not direct measures of capital goods substitutability we take it as the benchmark case as Hoxha et al. (2013) adopts this production function specification for welfare analysis of international financial integration. Moreover, this figure of 2.3 of elasticity of substitution is also related to the capital goods in the US economy.

83 This study uses sample of 22 MFIs and 29 LFIs as data on Algeria, Haiti and Papua New Guineas was not completely available in PWT 8.

We select this sample of countries for a number of reasons. Firstly, this classification is based on actual capital inflows of respective economies and defines the degree as well as the intensity of financial integration. GJ estimate the benefits of capital account liberalization for a group of 82 non-OECD countries using annual data for the year 1995. They specify the sample of countries based on OECD membership in 1995.[84] We consider the classification of Prasad et al. (2003) more appropriate for empirical analysis becaus it narrowly identifies an economy in terms of financial integration.[85] This classification ranks 76 industrial and developing countries on the basis of average of financial openness measure. In this sample of 55 developing countries, 22 countries fall in the category of MFIs and 33 economies in LFIs. MFIs consist of countries above the median level of the measure and LFIs comprise countries below the median level of financial integration.

Second, this classification by Prasad et al. (2003) excludes countries considered as highly indebted economies. Therefore, the classification does not include some countries namely Chad, Comoros, Ethiopia, Mozambique and Zambia. These countries receive more official flows and less private capital flows compared to other developing countries included in this classification of MFIs and LFIs. Thirdly, Kose et al. (2009) specify another classification based on a *de jure* measure of capital account openness developed by Schindler (2009). Panel data developed by Schindler (2009) which considers *de jure* restrictions on financial flows across countries consists of 91 high income, middle income and low income economies. We find that more than 40 countries classified as LFIs and MFIs by Prasad et al. (2003) are included in the list of panel of economies developed by Schindler in 2009.[86]

Finally, following Hoxha et al. (2008), we consider that developing and emerging economies continue to receive capital inflows because they adopt policies which allow differences in the rates of return to persist for long period of time. This, in turn, allows us to consider the time period 1961-2010 as limitedand measure welfare gains without assuming convergence in the values of parameters. Furthermore, we are interested in using the new information which has become available in PWT 8 about capital share in output, depreciation, and productivity over time for most countries included in this classification. Therefore, we consider this classification more appropriate to make welfare comparisons within a country

84 Mexico, South Korea and Turkey are a group of emerging economies which are included in OECD. Since they joined the group later, they are included in the sample of non-OECD countries. Mexico joined OECD in 1994 and South Korea in 1996.
85 Two countries like Haiti and Kenya which were not part of GJ study are included in Prasad et al. (2003) classification.
86 Kose et al. (2009) use the terms more financially open economies and more financially integrated economies interchangeably. We stick the classification in terms of MFIs and LFIs.

over time and seek additional insights about welfare responses of policies aimed at liberalizing and encouraging capital inflows to improve the living standards of the people.

3.7 Empirical methodology for time series analysis

The theoretical framework and parameters used in measuring welfare gains are explained in previous sections. This section presents the empirical methodology to conduct time series analysis to examine the causal relationship of welfare gains with trade channels of exports and imports. It explains the process of testing characteristics and properties of economic time series and provides a detailed discussion of econometric methodology to test for short-run and long-run Granger non-causality.

We begin the empirical analysis with an application of unit root tests to investigate time series properties of three variables namely welfare gains, exports and imports. The use of time series data which lack characteristics of stationarity in standard econometric specifications leads to serious errors in inferences because the results are neither consistent nor carry any economic meaning (Granger and Newbold, 1974). Therefore, if the variables are not stationary, standard time series methods do not apply for empirical analysis. In order to examine the order of integration of variables, we conduct three unit roots tests which include Augmented Dicky-Fuller (ADF), Phillips-Perron (PP) and Additive Outlier tests. Additive outlier test highlights the potential structural breaks which may exist in economic time series and test for a unit root by incorporating structural breaks.

3.7.1 Augmented Dicky Fuller Test (ADF)

ADF represents an extended version of Dicky-Fuller test in which regression equation is augmented with lagged changes ΔY_{t-h} where $h = \{1,2, \dots p)$ and p is the optimal lag length. This test suggests to include more lagged changes to avoid problem of serial correlation in Y_t. Unlike Dicky-Fuller test in which residuals based on AR (1) correlate with each other, ADF specification incorporates more lags so that residuals do not correlate among each other. The ADF test specification takes the following form:

$$\Delta Y_t = \emptyset^* Y_{t-1} + \varphi_1 \Delta Y_{t-1} + \varphi_2 \Delta Y_{t-2} + \cdots \varphi_p \Delta Y_{t-p} + e_t \qquad (3.20)$$

Where p shows optimal lag length used in above regression specification.[87] Y_t is a specific time series of welfare gains, exports and imports and $\Delta Y_t = Y_t - Y_{t-1}$.

The ADF test specification is modified when an intercept and a linear trend is included in the test equation. Equation (3.21) shows the ADF test equation with a constant but not trend. Equation (3.22) includes both the constant and a linear trend in the ADF test equation.

87 The optimal lag length is determined by Schwarz information criterion (SIC).

$$\Delta Y_t = \rho + \emptyset^* Y_{t-1} + \varphi_1 \Delta Y_{t-1} + \varphi_2 \Delta Y_{t-2} + \cdots \varphi_p \Delta Y_{t-p} + e_t \quad (3.21)$$

$$\Delta Y_t = \rho + \theta t + \emptyset^* Y_{t-1} + \varphi_1 \Delta Y_{t-1} + \varphi_2 \Delta Y_{t-2} + \cdots \varphi_p \Delta Y_{t-p} + e_t \quad (3.22)$$

The null hypothesis in case of ADF test is $\emptyset^* = 0$ (non-stationary) against the alternative hypothesis $\emptyset^* < 0$ (stationary). The test statistic in this equation corresponds to estimated regression coefficient $\emptyset^*$, in which we compare test statistic with Dicky-Fuller critical values.

3.7.2 Phillips-Perron (PP) test

The second unit root test that we use is Phillips and Perron (PP) test. Phillips and Perron (1988) suggest an alternative procedure of addressing problem of serial correlation in order to determine stationarity of economic time series. This non-parametric method provides a broader perspective of unit root theory and estimates standard Dicky Fuller equation and adjusts the t-ratio of estimated coefficients. PP test regression has the following form:

$$\Delta Y_t = \theta t + \emptyset^* Y_{t-1} + e_t \quad (3.23)$$

Phillips and Perron (1988) suggest to estimate equation (3.23) even when e_t is serially correlated and modify the t-ratio so that asymptotic distribution of test statistic is not affected by the problem of serial correlation. Both the ADF and PP tests provide same conclusions.

3.7.3 Additive outlier test

In this study, we test the time series properties of the three variables for the years 1961-2010. The previous two tests do not account for any structural break which may exist in the data. In order to consider any potential structural break which may exist in the data, we conduct breakpoint unit root test. We follow the additive outlier model specification of the breakpoint unit root test which assumes that breaks in the data takes place immediately (Zivot and Andrews, 1992 and Perron and Vogelsang, 1992).[88] We extend the analysis and allow for endogenous structural breaks in order to test for the unit root. The model takes the following form to test the null hypothesis:

$$y_t = y_{t-1} + \beta + \theta D_t(T_b) + \gamma DU_t(T_b) + \psi(L) e_t \quad (3.24)$$

y_t is a specific time series of welfare gains, exports and imports. $D_t(T_b)$ represents the trend-specific break dummy variable, $DU_t(T_b)$ represents the intercept break variable. β is a drift parameter and $\psi(L)$ denotes the lag polynomial which indicate dynamics of the stationary and invertible ARMA error process and e_t are i.i.d innovations. On the other hand, the alternative hypothesis for the trend stationary model which considers breaks in the intercept and trend takes the following form:

88 There is another breakpoint unit root test based on innovation outlier model which assumes that breaks in the data occur in a gradual manner (Perron, 1989).

$$y_t = \mu + \beta t + \theta DU_t(T_b) + \gamma DT_t(T_b) + \psi(L)e_t \quad (3.25)$$

The testing procedure is conducted in two steps. In step 1, intercept, trend and breaking variables are detrended using OLS technique. The detrended series is used to test for the unit root employing an augmented Dicky-Fuller framework mentioned above. In step 2, residuals are obtained which incorporate the structural breaks from the detrending equation and use Dicky-Fuller unit root test equation to test the null hypothesis. In the absence of the structural break, there may be a possibility of not rejecting the null hypothesis of the unit root. Thus, in order to conduct effective unit root test, it is important to incorporate structural breaks which may exists in the data (Zivot and Andrews, 1992 and Perron and Vogelsang, 1992).

3.7.4 Co-integration

We test for co-integration to explore the dynamic relationships between welfare gains, exports and imports. Co-integration is an econometric technique which shows how to determine stationary linear combinations of non-stationary time series (Engel and Granger, 1987). We employ Johansen and Juselius (1990) technique to test for co-integration. This method requires estimating the following n-variate, p[th] - order Gaussian vector autoregressive (VAR) specification

$$z_t = \mu + A_1 z_{t-1} + A_2 z_{t-2} \dots A_p z_{t-p} + \ominus\, D_t + vt + e_t \quad (3.26)$$

In the current empirical analysis, we use three variables. In the above equation, $z_t =$ (welfare gains, exports and imports), A_i 's represent the (3×3) coefficient matrices, and $e_t = (e_{1t}, e_{2t}, e_{3t})'$ denote the unobservable error term. μ represents a vector of constants. D_t is an intercept dummy and t shows the trend in the data.[89]

The above VAR(p) process shows stability in the absence of a unit root.[90] In case VAR(p) process possesses a unit root, then some or all variables are integrated. Co-integration means that there exists a possibility of a linear combination of the variables which have common stochastic trend. In other words, a group of I(1) variables is co-integrated if their linear combination is I(0). Though VAR processes hold good for variables with stochastic trends, they are unable to account for co-integrating relations which do not appear in explicit form. To proceed further, we derive the vector error correction models (VECMs) or vector equilibrium correction modelsby rearranging equation (3.26):

$$\Delta z_t = \mu + \Pi z_{t-1} + \Gamma_1 \Delta z_{t-1} + \cdots \Gamma_{p-1} \Delta z_{t-p+1} + e_t \quad (3.27)$$

Equation (3.27) can be rewritten as follows:

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89 The trend can be linear or quadratic depending on the nature of the model. Theoretical derivations require a clear separation of the process in deterministic and stochastic components (Lutkepohl, 2005)

90 The optimal lag length is determined by Akaike's Information Criterion (AIC).

$$\Delta z_t = \mu + \Pi z_{t-1} + \sum_{j=1}^{p-1} \Gamma_j \, \Delta z_{t-j} + e_t \tag{3.28}$$

In equation (3.28), μ is a (3×1) vector of parameters which represent the intercept constituting all constant terms. The term Πz_{t-1} includes the co-integrating relations. Π is the long-run matrix which is written as $\Pi = \alpha\beta'$. It is a product of $(3 \times r)$ matrices α and β with $\text{rk}(\alpha) = \text{rk}(\beta) = r$. More specifically, for a three time series case with $r = 2$ showing two co-integrating relations, we have

$$\Pi z_{t-1} = \alpha\beta' z_{t-1} = \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \\ \alpha_{31} & \alpha_{33} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{21} & \beta_{31} \\ \beta_{12} & \beta_{22} & \beta_{32} \end{bmatrix} \begin{bmatrix} z_{1,t-1} \\ z_{2,t-1} \\ z_{3,t-1} \end{bmatrix} \tag{3.29}$$

$$= \begin{bmatrix} \alpha_{11} ec_{1,t-1} + \alpha_{12} ec_{2,t-1} \\ \alpha_{21} ec_{1,t-1} + \alpha_{22} ec_{2,t-1} \\ \alpha_{31} ec_{1,t-1} + \alpha_{33} ec_{2,t-1} \end{bmatrix}$$

Where $ec_{1,t-1} = \beta_{11} z_{1,t-1} + \beta_{21} z_{2,t-1} + \beta_{31} z_{3,t-1}$

And $ec_{2,t-1} = \beta_{12} z_{1,t-1} + \beta_{22} z_{2,t-1} + \beta_{32} z_{3,t-1}$

Furthermore, for a three time series variable case with $r = 1,$ there will be one co-integrating vector. In such a situation, we have

$$\Pi z_{t-1} = \alpha\beta' z_{t-1} = \begin{bmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \end{bmatrix} \begin{bmatrix} \beta_{11} & \beta_{21} & \beta_{31} \end{bmatrix} \begin{bmatrix} z_{1,t-1} \\ z_{2,t-1} \\ z_{3,t-1} \end{bmatrix} \tag{3.30}$$

$$= \begin{bmatrix} \alpha_{11} ec_{1,t-1} \\ \alpha_{21} ec_{1,t-1} \\ \alpha_{31} ec_{1,t-1} \end{bmatrix} \text{ where } ec_{1,t-1} = \beta_{11} z_{1,t-1} + \beta_{21} z_{2,t-1} + \beta_{31} z_{3,t-1}$$

The matrix α is known as loading matrix which represents adjustment parameters. It includes the weights associated with number of co-integrating relations in individual equations of the VECM model. The terms $\Gamma_j s$ $(j = 1, \dots, p-1)$ in equation (3.28) represent *short term parameters* of the VECM framework. The rank of the long-run matrix provides the number of independent co-integrating vectors in the system. In other words, the rank of matrix Π is called the co-integrating rank and β refers to the co-integration matrix representing the long-run parameters.

If two variables are I(1) and one variable is I(0), then there are two possible options. First, we take the first difference of I(1) variables to convert them into I(0) form and estimate VAR model in all I(0) variables. Alternatively, we can apply VECM with the careful interpretation of co-integration. For example, in equation 3.26, $z_t =$ (welfare gains, exports and imports). If two variables in z_t are classified as I(1) and one is I(0), in a three time series variable case with $r = 1,$ we have

$$\Pi z_{t-1} = \alpha\beta' z_{t-1} = \begin{bmatrix}\alpha_{11}\\ \alpha_{21}\end{bmatrix}\begin{bmatrix}\beta_{11} & \beta_{21}\end{bmatrix}\begin{bmatrix}z_{1,t-1}\\ z_{2,t-1}\end{bmatrix} \quad (3.31)$$

$$= \begin{bmatrix}\alpha_{11}ec_{1,t-1}\\ \alpha_{21}ec_{1,t-1}\end{bmatrix} \qquad \text{where } ec_{1,t-1} = \beta_{11}z_{1,t-1} + \beta_{21}z_{2,t-1}$$

In the context of VECM specification in (3.28), Δz_t, will include I(1) variables in difference form and I(0) variable in level form. [91]

Identifying restrictions on the long-run parameters (β) constitute an important feature of the VECM estimation. Putting these restrictions allow us to obtain the identified estimator of β by transforming $\hat{\beta}$. It means that if β is a single vector, the first component is normalized by dividing the vector $\hat{\beta}$ by it first component (Lutkepohl, 2005). In a three variable case, with two co-integrating vectors, the process of testing restrictions on the co-integration relations entails replacing the relevant element of co-integrating matrix with zero.

For example, $\beta = \begin{bmatrix}\beta_{11} & \beta_{12}\\ \beta_{21} & \beta_{22}\\ \beta_{31} & 0\end{bmatrix} = [H_1\varphi_1, H_2\varphi_2]$ with $H_1 = I_3$ and $\varphi_1 = (\beta_{11}, \beta_{21}, \beta_{31})'$ and $H_2 = \begin{bmatrix}1 & 0\\ 0 & 1\\ 0 & 0\end{bmatrix}$ and $\varphi_2 = (\beta_{11}, \beta_{22})'$ (Lütkepohl, 2005). In such a situation, estimation of maximum likelihood proceeds with iterative optimization in contrast to a simple two step estimator available in closed form. [92] We test for co-integration relations through these restrictions.

In order to specify the co-integrating rank, standard sequential testing procedures based on likelihood ratio (LR)- type tests are employed. For this purpose, we may consider the following sequence of hypothesis:

$$H_0\,(0): rk(\Pi) = 0 \text{ versus } H_1\,(0): rk(\Pi) > 0$$
$$H_0\,(1): rk(\Pi) = 1 \text{ versus } H_1\,(1): rk(\Pi) > 1$$
$$H_0\,(2): rk(\Pi) = 2 \text{ versus } H_1\,(2): rk(\Pi) = 2 \quad (3.32)$$

Johansen (1991, 1995) formulates two test statistics which are called LR_{trace} and LR_{max}. LR_{trace} called the *trace test* takes the following form:

$$LR_{trace}(r_0) = -T\sum_{j=r_0+1}^{3} log\left(1-\lambda_j\right) \quad (3.33)$$

91 For example, if z_{1t}+ z_{2t} +z_{3t} are welfare gains, exports and imports respectively and z_{1t} is I(0) and z_{2t} +z_{3t} are I(1), then $\Delta z_t = (z_{1t}, \Delta z_{2t}, \Delta z_{3t})$.

92 Lutkepohl (2005) explain a simple two step estimator for the co-integration matrix. Moreover, Johansen (1990,1991) also provide further details of various hypothesis about the error correction terms (α) and long run co-integrating vectors (β).

λ_j are eigenvalues of Π obtained through reduced rank regression technique applied on the VECM framework.[93] These eigenvalues are arranged such that $\lambda_1 \geq \lambda_2 \geq \lambda_3$. The trace statistics tests the null hypothesis $H_0: r = r_0$ which highlights that number of co-integrating vectors is either less than or equal to r_0. [94] The alternative hypothesis $r > r_0$, on the other hand, states there exists more than r_0 co-integrating vectors. The value of the trace statistics $LR_{trace} = 0$ when all the $\lambda_j = 0$ for $(j = 1, \ldots, 3)$.

The second test statistic is the λ_{max} which carries separate test on each eigenvalue calculated from characteristics roots and takes the following form:

$$LR_{max}(r_0, r_0 + 1) = -T\ log\left(1 - \lambda_{r_{0+1}}\right) \qquad (3.34)$$

In this case, the null hypothesis $H_0: r = r_0$ states that number of co-integrating vectors equals r_0 against the alternative that number of co-integrating vectors equals $r = r_0 + 1$.

Both LR_{trace}, and LR_{max} tests have non-standard limiting distributions and the critical values depend on the restrictions of the rank, number of non-stationary components as well as specification whether constant and trend form part of the system. Trace tests, however, show slightly higher degree of distortions in terms of magnitude compared to maximum eigenvalue tests in small samples despite having power advantages (Lutkepohl, Saikkonen and Trenkler, 2001). Co-integration requires that the rank of Π matrix should be strictly $0 < \mathrm{r} < 3$. [95]

One of the key objects of this study is to examine long-run relationships between welfare gains, exports and imports in addition to short-run relations. In co-integrated systems, we investigate Granger non-causality in the framework of a VECM. This modelling approach allows for testing both the short-run and long-run relationship since it includes an error correction term (ECM) in a proper VAR framework. Following Johansen (1991, 1995) the procedure begins with estimation of parameters of VECM using maximum likelihood method which decomposes log-likelihood function in terms of r largest eigenvalues. If the process z_t is Gaussian or in other words, $e_t \sim \mathcal{N}(0, \sum_e)$, the likelihood function takes the following form:

$$LnL_T(\theta) = \frac{1}{T-p}\sum_{t=p+1}^{T} Ln\ f\left(z_t | z_{t-1}, z_{t-2} \ldots z_{t-p}; \theta\right) \qquad (3.35)$$

$=-\frac{N}{2} ln2\Pi - \frac{1}{2} ln|V| - \frac{1}{2(T-P)}\sum_{t=p+1}^{T} v_t' V^{-1} v_t$ with unknown parameters θ. T is the sample size repsenting number of observations, p indicates the lag length and V is the estimated

93 The reduced rank regression is also called canonical correlation analysis which explains the linear combinations of the variables having maximum correlation with each other (Anderson, 1984).

94 The testing is done sequentially to test the null hypothesis that the number of co-integrating vectors is at most r_0 against the alternative that it is more than r_0 where $r_0 = 1,2,3$. in the current study.

95 However, if some components are stationary, there exists a trivial co-integrating vector in which case the rank of the Π matrix will be different.

co-variance matrix. The unknown parameters include $\theta = \{\mu, \Pi, \Gamma_{1,}\Gamma_{2,} \ldots \Gamma_{p-1,}V\}$. We obtain maximum likelihood estimator by choosing θ to maximize $LnL_T(\theta)$ and solve following first order condition:

$$G_t(\hat{\theta}) = \left.\frac{\partial \ln L_T(\theta)}{\partial \theta}\right|_{\theta=\hat{\theta}} = 0 \qquad (3.36)$$

for $\hat{\theta}$. The log likelihood function indicating decomposition in terms of *r* largest eigenvalues is written as follows:.

$$LnL_T(\hat{\beta}) = -\frac{N}{2}(1 + ln2\Pi) - \frac{1}{2}ln|S_{00}| - \frac{1}{2}\sum_{i=1}^{r} ln(1 - \hat{\lambda_\iota}) \qquad (3.37)$$

In equation (3.37), S_{00} shows the sum of the squares matrices obtained from residuals and λ shows eigenvalues. [96]

3.8 Testing for Granger non-causality

Granger non-causality is an econometric technique which facilitates in testing the short-run and long-run association of economic variables based on time series data. In order to test for Granger non-causality, we need to check the null hypothesis whether specific coefficients in a VAR or VECM specification are zero. For this purpose, we employ the standard F-test for zero restrictions on the coefficients of a respective VAR or VECM based on the Wald principle.[97] In the current study, we test for short-run and long-run Granger non-causality from trade variables of exports and imports to welfare gains for 51 countries classified into two groups as MFIs and LFIs based on the time series properties of unit roots and co-integration tests.

We investigate the short-run and long-run equilibrium relationship between welfare gains, exports and imports within the VECM framework. It is important to note that all variables in the VECM framework are considered endogenous. Deviations from the long-run equilibrium are adjusted through interactions of the variables with each other in the short-run. This interaction in VECM system happens through the impact of the lagged variables. It occurs in a specific variable either through the error correction term of the VECM or the lags of other variables. We test it through the joint significance of the coefficients of the error correction term and the lagged difference variables in equation (3.28). These channels in effect determine whether a variable is strongly exogenous or weakly exogenous.[98]

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96 We extract this discussion on maximum likelihood function from Martin et al (2013) who also provide step wise procedure of implementing the Johansen estimator.
97 χ^2 test is also based on the Wald principle.
98 Wojciech, C. and Deadman (1992) refer this testing procedure as strong exogeniety test. Martin et al (2013) explain this testing procedure in terms of strongly exogenous and weakly exogenous variables.

The joint significance of the coefficients of the error correction term (α_{ij}) and the lagged difference variables $\Gamma_j s$ determines causality between the variables. We test it through standard F- test for zero restrictions. It requires rejection of the null hypothesis that coefficients of the error correction term and lagged difference variables are zero. It is, however, worth mentioning that this testing procedure determines overall causality in the model without differentiating the direction of causality in the short-run and long-run. The long-run causal relationships between exports, imports and welfare gains are established by the joint significance of long-run coefficients and error correction term. We determine the joint significance of long-run coefficients by testing the general linear hypothesis on the long-run coefficient β as follows:

$H_0: \beta = (H_1\varphi_1, \ldots H_i\varphi_i)$ where $H_i\big(p \times (p - m_i)\big)$ imposes m_i restrictions on β_i . φ_i is a matrix of unknown parameters.[99] Under the null hypothesis, the Wald test is asymptotically distributed as χ^2 with the degrees of freedom equal to the number of restrictions imposed on coefficients (Hamilton, 1994). The likelihood ratio test statistic is given as follows:

$$LR = T\{log|\widehat{\Omega}_0| - log|\widehat{\Omega}_1|\} \tag{3.38}$$

In equation (3.38), T is the number of observations in the system. $\widehat{\Omega}_0$ and $\widehat{\Omega}_1$ represent the restricted and unrestricted maximum likelihood estimators. These estimators are used to compare the variances of the data under both the null and alternative hypothesis. We determine the direction of the long-run causality by looking at the signs of the long-run coefficients and error correction term.[100]

The Wald test and likelihood ratio test are two important procedures which are employed in obtaining statistics for hypothesis testing in the maximum likelihood estimation.[101] An important property of the Wald test is that it estimates the model in unrestricted form. This is particularly relevant in situations when estimation is relatively difficult under the null hypothesis compared with the alternative hypothesis. The hypothesis used to represent a parameter in Wald test statistic is given as:

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99 The joint test by excluding a specific long run variable can be expressed as a hypothesis. For example, in a trivaraite case, $H_0: \beta = H\varphi$ where φ is a matrix of unknown parameters and H= $\begin{bmatrix}1 & 0\\0 & 0\\0 & 1\end{bmatrix}$ (Thangavelu and Rajaguru, 2004).

100 Rajaguru and Abeysinghe (2008) show that long run causality can be determined if the error correction term is estimated with the correct sign.

101 There is also a third procedure which is the Lagrange Multiplier test (LM) which is used in hypothesis testing. The current study employs the Wald test and LR test to test for short run and long run Granger causality in the maximum likelihood framework.

$$W = (\hat{\varphi}_1 - \varphi_0)'[cov(\hat{\varphi}_1 - \varphi_0)]^{-1}(\hat{\varphi}_1 - \varphi_0) \tag{3.39}$$

It is asymptotically distributed as χ^2_M, where M indicates the number of restrictions under the null hypothesis. The null hypothesis is $H_0: \varphi = \varphi_0$. In the current study, we employ the Wald test to test the significance of the error correction term and long-run coefficients in co-integrated systems. φ, therefore, refers to the long-run parameters (β) and error correction term (α).

The variance of $\hat{\varphi}_1$ is defined as follows:

$$cov(\hat{\varphi}_1 - \varphi_0) = cov(\hat{\varphi}_1) = \frac{1}{T}\Omega(\varphi_0) \tag{3.40}$$

This test is implemented by substituting $\Omega(\varphi_0)$ by a consistent estimator estimated under the null hypothesis $\widehat{\Omega}(\hat{\varphi}_1)$. Given this Wald statistic can be written as follows:

$$W = T(\hat{\varphi}_1 - \varphi_0)'\widehat{\Omega}^{-1}(\hat{\varphi}_1)(\hat{\varphi}_1 - \varphi) \tag{3.41}$$

This test compares the unrestricted value $\hat{\varphi}_1$ with the value under the null hypothesis. W is small when the two values are close to each other (Martin et al, 2013). The likelihood ratio test, on the other hand, entails estimating the model in restricted and unrestricted forms to test the null and alternative hypothesis.

If the systems are not co-integrated, we test for short-run Granger non-causality only through joint test of all the coefficients of lagged difference variables. We employ pairwise Granger causality tests to find out whether an endogenous variable is taken as exogenous variable. There are several cases for which we test for Granger causality. The first case represents a situation when all variables are I(0), and $r = 3$, we determine short-run causality using F-test for zero restrictions on VAR coefficients estimated in levels. In such a situation, equation (3.26) represents a stationary VAR process to test for short-run Granger non-causality. The testing strategy to establish Granger non-causality can be carried out in the following three-dimensional VAR specification:

$$z_t = \begin{bmatrix} z_{1t} \\ z_{2t} \\ z_{3t} \end{bmatrix} = \sum_{i=1}^{p} \begin{bmatrix} a_{11,i} & a_{12,i} & a_{13,i} \\ a_{21,i} & a_{22,i} & a_{23,i} \\ a_{31,i} & a_{23,i} & a_{33,i} \end{bmatrix} \begin{bmatrix} z_{1,t-i} \\ z_{2,t-i} \\ z_{3,t-i} \end{bmatrix} + e_t \tag{3.42}$$

Given the above VAR process, we test Granger causality from z_{2t} to z_{1t} by testing the following null hypothesis.

$$H_0: a_{12,i} = 0, i = 1, \dots p \tag{3.43}$$

$$H_1: a_{12,i} \neq 0, = 1, \dots p \tag{3.44}$$

The rejection of the null hypothesis requires the F-statistic be jointly significant.

On the other hand, if all variables are I(1) and $r = 0$, we specify a VAR process in first differences and test for short-run Granger non-causality employing standard F-test for zero restrictions. In that case, VAR process in first differences takes the following form:

$$\Delta z_t = \mu + \sum_{j=1}^{p-1} \Gamma_j \, \Delta z_{t-j} + \ominus \, D_t + e_t \qquad (3.45)$$

VAR representation in (3.45) is distinguished from the VECM framework in (3.29) in that it does not have a term Πz_{t-1} which contains co-integration relations.

As mentioned before, we are investigating the casual effects of exports and imports on welfare gains for a sample of 51 economies. Given varied time series properties of the three variables, there exists intermediate cases in which co-integration is not present. These intermediate cases arise when two variables are I(1) and one variable is I(0) or vice versa. In these cases, we modify the VAR process by including lagged terms for I(1) variables and levels terms for I(0) variables. In these intermediate cases, we test for Granger non-causality by using F-test for zero restrictions. We establish the direction of causality by the sign of the sum of estimated coefficients in a respective VAR model.

In summary, we conduct three kinds of causality tests depending on the time series characteristics of the three variables. The first type referred to as the strong exogeneity test entails joint significance of the coefficients of all lagged variables and error correction term. It establishes overall causality. The second type requires testing joint significance of the long-run coefficient and error correction terms. It determines long-run causality. The last causality testis relatively straight forward which requires joint test on the significance of short-term lagged variables for determining short-run Granger causality. We discuss the results of the short-run and long-run causal effects of exports and imports on welfare gains in individual countries in Chapter 6.

3.9. Multivariate residual based diagnostics

Finally, we conduct multivariate residual diagnostics for the estimated VAR and VECM models for respective countries to examine standard assumptions about residuals which include normality of errors, no autocorrelation, and constant variance. We perform the following diagnostics tests.

3.9.1 Autocorrelation LM Test

Following Johansen (1995) we define autocorrelation LM Test that provides a proper weighting to the residual autocorrelation. It is called Lagrange multiplier test for residual autocorrelation. As explained in Johansen (1995), it is computed since estimated residuals are regressed on the lagged residuals as well as regressor of the respective estimated model. Under the null hypothesis of no serial correlation of order h, the corresponding test statistic is the LM statistic which is asymptotically distributed as $\chi 2$ with degrees of freedom given by f = p^2. The test statistic is written as follows:

$$LM(s) = \left(T - pk - m - p - \frac{1}{2}\right) log \frac{|\widehat{\Omega}|}{|\overline{\Omega}|} \quad (3.46)$$

$\widehat{\Omega}$ is the variance estimate and $\overline{\Omega}$ is the estimate from the auxiliary regression. In equation (3.46), T indicates the number of observations, pk explains the number of additional regressors in the auxiliary regression, m shows the number of regressors in each equation of the original system and p is the optimal lag length.

3.9.2 Test for non-normality

Following Johansen (1995) and Lutkepohl (2005), we define test for non-normality based on the third and fourth central moments (skewness and kurtosis) of the normal distribution. Lutkepohl (2005) explain that if x is a univariate random variable with standard normal distribution, i.e., x ~N(0, 1), we call the third and fourth moments as $\mathrm{E}\ (\mathrm{X}^3) = 0,$ and $\mathrm{E}(\mathrm{X}^4) = 3$. In case of the multivariate test, we choose a factorization of the k residuals which are orthogonal to each other. We report test statistic value of Cholesky factor of the residual covariance matrix which depends on the ordering of the respective variables included in the Vector autoregressive model.

The test statistic is given below:

$$JB = (T - pk - m)\left(\frac{b_1}{6} + \frac{(b_2 - 3)^2}{24}\right) \quad (3.47)$$

In equation (3.47), T indicates the sample size, m denotes the central moments on which the test is based, b_1 and b_2 shows the skewness and Kurtosis, p is the degree of freedom and k is the optimal lag length.

3.9.3 White Heteroscedasticity Test

Following Doornik (1996), this test regression regresses each cross product of the residual on the cross products of the regressors. The next step requires the testing of the joint significance of the regression. The regression in this test also considers constant as one of the regressor. Under the null hypothesis of no heteroscedasticity, the test requires those non-constant regressors are not jointly significant for constant variance. The asymptotic distribution of such a test is also χ^2 with degrees of freedom mn, where $m = \frac{k(k+1)}{2}$ is the number of cross products of the residuals in the system and n constitutes the right-hand side variables in the test regression. [102]

3.10 Summary

This chapter provides an overview of the theoretical framework for measuring welfare gains anddescribes the processfor constructing time series of welfare gains within emerging and developing economies overtime. We depart from previous works and employ time-varying country based characteristics in welfare calculations. We extract time-varying parameters from PWT 8. In addition, this chapter explains the estimation technique of time preference rate for each country included in the sample. We argue that consumption and output profiles of all emerging and developing economies are not uniform and monotonic over time. It also sheds lights on the additional arguments of the relevant growth literature regarding balanced and non-balanced economic growth in constructing time series of welfare gains. The previous literature which focuses on measuring welfare gains at a point in time has ignored the time-varying aspects of welfare gains and heterogeneous effects of financial integration.

This study uses the *time series* of welfare gains measured as a ratio of actual consumption relative to autarky to empirically investigate the casual relationship between trade and welfare gains. This chapter contains the description of the empirical methodology and techniques for the analysis of the time series data. We consider the variants of the Dicky Fuller and additive outlier models for unit roots before explaining in detail the co-integration test. Finally, we explain the testing strategies in order determine the direction of the long run and short run relations between the variables.

Our contribution is twofold: first we construct *time series* of *country-specific* welfare gains to match actual experience of an economy in question and obtain more policy-relevant insights about welfare effects of international financial integration within economies over time. Secondly, we consider that both international financial integration and trade contributes in improving the standards of living of the people. This argument connects the welfare gains from integration to trade variables of exports and imports. We further think that there may be short-run and long-run welfare consequences of international trade. In order to analyze these consequences, we investigate the short-run and long-run dynamics of welfare gains, exports and imports in an attempt to highlight dynamic interrelationships between these economic processes and variables. The next chapter discusses parameters as well as the results of time

102 Doornik (1996) also provides its F approximation and relevant for degrees of freedoms, dimension of the auxiliary system and number of regressor for exclusion.

series of country-specific welfare gains. Chapter 5 explains selective country experiences of welfare gains. Chapter 6 provides a discussion about the results of the time series analysis and short-run and long-run Granger non-causality.

CHAPTER 4
COMPUTATION AND DISCUSSION OF WELFARE GAINS

4.1 Introduction

The previous chapter explains the theoretical framework for analysis, specification of parameters used to measure welfare gains and empirical methodology for the short-run and long-run casual effects of exports and imports on welfare gains. This chapter provides a discussion of parameters specified and describes the results of four alternative *time series measures* of welfare gains. We estimate the country-specific time preference rate and extract remaining parameters which include capital's share in output, depreciation rate of capital and total factor productivity from PWT version 8.0. The rest of the chapter unfolds as follows: Section 4.2 provides a detailed discussion of these main parameters considered common across countries in previous works. We use country-specific parameters in welfare calculations to examine welfare comparisons within a country over time. These parameters values are used to compute rates of return and capital output ratios for each country. Section 4.3 evaluates the implications of country-specific parameter values on the rate of return to capital. Section 4.4 discusses the time-varying capital output ratios within MFI and LFI economies.

We use available data on per capita consumption as consumption under integration and the path of rate of return to derive consumption under autarky. The implied welfare gains are expressed in terms of a ratio of actual consumption relative to autarky. We compute this welfare ratio for each country within MFIs and LFIs for the period 1961-2010. We select this sample of countries since it classifies an economy experiencing a certain degree of financial integration over the years based on relevant data sources of financial integration. This allows us to draw more on country-specific experiences to seek more relevant insights regarding welfare effects of international financial integration within a country over time. Section 4.5 explains the trends of four alternative measures of welfare gains in the two groups. It also provides a regional perspective of welfare gains within this classification of countriesalong with overall summary of the discussion.

4.2 Parameters used in welfare calculations

Welfare gains depend on the choice of parameter values explained in the theoretical framework developed by GJ and Hoxha et al. (2013). We specify parameters values for computing autarky consumption based on the Euler equation (3.5) and measure welfare gains. The main parameters specified in the theoretical framework include time preference rate, capital's share in output, depreciation rate of capital, total factor productivity growth, and coefficient of relative risk aversion. These parameters play a significant role in analyzing the impact of capital mobility on economic growth and determine the speed with which rich and poor economies converge in the context of neoclassical economic model (Barro, Mankiw, Sala-i-Martin, 1992). Later on, many studies measuring welfare gains of international capital flows use similar parameter values calibrated for the US economy (GJ; Hoxha et al, 2013; Brock, 2015).

We begin the discussion on these parameters with Table 7 adopted from GJ. It shows common parameters values used in measuring welfare gains. GJemploy neoclassical economic model and assume common parameter values from the US economy in welfare calculations. The assumptions of neoclassical economic model in GJ framewrok implies that countries converge towards balanced growth path and achieve steady state level of capital in autarky irrespective of liberalization of capital flows.

Table 7: Common Parameters in previous literature

Common Parameters	Value of Parameters
Time preference rate β	0.96
Capital's Share in output α	0.3
Depreciation rate δ	0.06
Total factor productivity growth g	1.012
Coefficient of Risk Aversion σ	1

Source: GJ

The present study introduces dynamics by considering that countries undergo structural changes at different points in time and construct *time series* of welfare gains. Many studies emphasize the role of structural changes in economic growth reflected in the reallocation of labour across various economic sectors (Chenery, 1960; Kongsamut, 2001; Ngai and Pissarides, 2007). Acemoglu and Guirrieri (2008) observe that growth theory also incorporates structural and systematic changes in non-balanced economic growth without fundamentally altering the theoretical underpinnings that constitute long-run economic growth. In addition, there are differences in productivity growth across countries and these differences in productivity levels according to Makiw et al (1992) show "not just technology, but resource endowment, climate, institutions, and so on". This study measures welfare gains from international financial integration by incorporating these structural changes reflected in country-specific parameters values over time. Since the process of financial openness and integration starts at different time periods, it is more appropriate and plausible to analyze time- arying welfare gains withincountries. In the next few sections, we discuss time series perspective of country-specific parameters to highlight their significance and show how time-varying changes in country-specific measures affect the size of welfare gains.

4.2.1 Time preference rate: $(\boldsymbol{\beta})$

The first parameter is time preference rate. It shows the rate at which people discount future utility and indicates that utility increases by consuming today instead of tomorrow. It captures impatience which highlights preferences of the people for the present consumption over future consumption. The literature on welfare calculations uses a fixed value of time preference rate (β)(GJ & Hoxha et al, 2013). Following this strand of literature, we consider value of time preference rate of 0.96 from the US economy mentioned in Table 7to compute the first time series of implied welfare gains. This enables us to compare welfare effects of capital flows and the sensitivity of this parameter in subsequent welfare calculations.

The use of the fixed value of time preference rate assumes that people are equally impatient in terms of consumption patterns across economies. This assumption implies that peoples' preferences of current consumption over future consumption are determined by a fixed and uniform rate of time preference. However, this assumption may not be plausible for measuring welfare gains of all countries with different degrees of patience. Fisher (1930) also observes that households' need not value preferences for current and future consumption equally which indicate dynamic nature of their consumption behaviour. Carroll and Summers (1991) observe that time preference rate varies between a less rapidly growing economy and rapidly growing economy. Moreover, Beckar and Mulligan (1997) describe time preference rate varies because people are not equally patient across countries. This argument highlights the significance of differences in time preference rates in MFIs and LFIs. Additionally, there is considerable empirical evidence which suggests huge variability in time preference rates (Frederick et al, 2002). We, therefore, extend the analysis and explore welfare effects of country-specific time preference rates to account for consumption patterns of people in different countries. The second time series of welfare gains, therefore, uses *country-specific* subjective time preference rate in terms of discount factor derived from real interest rates data in equation (3.18).[103]

$$\beta = \frac{1}{(1+r)}$$

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103 Time preference rate is also called time discount rate or discount factor. Therefore, the terms time preference rate, time discount rate and time discount factor are used interchangeably. All three terms capture the same effect. We refer it as the time discount factor for the case in which it is calculated from real interest rate. Since data on real interest rates was not available for all the years from WDI, the average is based on the available number of years.

Appendix 3 provides the results of time discount factors computed from real interest rate data for MFIs and LFIs. The results indicate that the value of time discount factor calculated using this approach lies in the range of 1.03 and 0.7 for MFIs. Venezuela shows the highest value while Brazil has the lowest value of time discount factor. In order to present a succinct argument, Table 8 shows time discount factors of selected MFIs and LFIs whose value is lower than 0.96, the bench mark value used in previous empirical literature. A lower value of time discount factor shows that households in an economy are more impatient and vice versa. They prefer to consume today since the same amount of current consumption yields lower level of utility if it comes about in future. This consumption behaviour of households' in which they prefer current consumption over future consumption makes economies more impatient and induces a lower rate of capital accumulation. Three countries whose value of time discount factor falls below 0.9 are Brazil, Israel and Peru. Israel's time discount factor is 0.88 while Peru's is 0.87. Becker and Mulligan (1997) explain that the value of the time discount factor lies below 1 because of the imperfect ability of the individuals to accurately predict the future consumption. However, this value exceeds unity for individuals who are willing to spend resources to improve their future predictability. There may be other theoretical considerations about choices of utility which affect time discount rate, in the current study however; we are only interested in highlighting the country-specific variability of the time discount rate and its role in welfare calculations.

On the other hand, the range of this parameter for LFIs lies between 0.79 to 1.21. Ghana shows the highest value of 1.21 while Ecuador has the lowest value of 0.79. The results in the Appendix 3 show that majority of the countries in the LFI group have time discount factors of less than 0.96, the benchmark value used in the literature. It indicates that people in these economies are generally more impatient because the cost of current consumption is low compared to future consumption. All five countries reported in Table 8 have time discount factors of less than 0.90.

Table 8: Five lowest time Discount factor derived from real interest rates for selected MFIs and LFIs to compute autarky level of consumption

No	MFIs	Value	LFIs	Value
1	Brazil	0.7	Ecuador	0.79
2	Peru	0.87	Uruguay	0.83
3	Israel	0.88	Paraguay	0.85
4	Chile	0.9	Dominic Republic	0.89
5	Columbia	0.9	Cameroon	0.89

Source: Calculations based on available WDI data on real interest for respective economies

Furthermore, following Hall (1978) and Campbell and Mankiw (1989) we estimate equation (3.19) to obtain time preference rate for each country.[104]

$$c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 Y_t + e_t$$

GJ assume that there is no uncertainty indicating that the steady state consumption is entirely predictable and constant over time. We estimate equation (3.19) which allows for incorporating uncertainty in the empirical analysis and highlight that households also save for precautionary reasons. This is also consistent with Coeurdacier et al. (2013) who develop a framework which combines gains coming from both approaches of capital scarcity as well as risk sharing. Since equation (3.19) is not estimated by ordinary least squares due to problem of endogeneity, we employ the instrumental variable approach to examine how lagged consumption and current income predict current consumption.[105] Following Mankiw (1991), who suggests that lagged values of income is a potentially valid instrument, we include appropriate lags of income as an instrument to account for the problem of endogeneity in the empirical analysis.

Appendices 4A and 4B provide the results of estimated values of time preference rates for MFIs and LFIs. The number of structural breaks in the form of dummies included in the estimation procedure for each country is provided in Appendices 4E and 4F. The results show that coefficient of consumption in previous period is significant for all countries at 1% or 5% level of significance. We assume the estimated value of this coefficient as the time preference rate for each country to measure welfare gains.

The results in Appendix 4A indicate that though estimated value of this coefficient is 0.96 for some countries; it is different from 0.96 for many other countries. The range of time preference rate (β) for MFIs lies between 0.73 to 1.04. This value of time preference rate is lower than 0.9 for more than half of the MFI economies. For the LFIs, the results show even higher degree of differences in time preference rate (Appendix 4B). The gaps in LFIs widens from less than 0.3 to 1.06. Table 9 below provides the estimated value of the time preference rates for selected MFIs and LFIs. Morocco shows the lowest value of 0.73 in MFIs category followed by Israel, Turkey, China and Indonesia. Burkina Faso ranks the lowest with the value of 0.28 among LFIs followed by Ghana, Dominic Republic, Nigeria and Panama. This again shows that patience levels of households to consume across economies differ and highlights

104 GJ assume that there is no uncertainty. In such a situation, consumption would be constant over time. As we are constructing *time series* of welfare gains, we regress current consumption on its lagged value as well as current income. This is more consistent with literature on consumption under uncertainty (Hall, 1978).

105 We use current income following Campbell and Mankiw (1989) as we consider consumption as endogenous rather than exogenous. Moreover, Hall (1978) shows lagged income is not useful in predicting future consumption.

the significance of countries' respective macroeconomic conditions in determining welfare gains. [106]

Table 9: Estimated time preference rates for selected MFIs and LFIs to compute autarky level of consumption

No	Country MFIs	$(\boldsymbol{\beta})$	Country LFIs	$(\boldsymbol{\beta})$
1	Morocco	0.73*** (0.11)	Burkina Faso	0.28** (0.12)
2	Israel	0.74*** (0.10)	Ghana	0.39*** (0.17)
3	Turkey	0.76*** (0.16)	Dominic Republic	0.47*** (0.13)
4	China	0.77*** (0.09)	Nigeria	0.47*** (0.12)
5	Indonesia	0.78*** (0.06)	Panama	0.57*** (0.21)

Note: Standard errors are reported in the parenthesis. *, **, *** shows 10%, 5%, and 1% level of significance respectively.

Overall, the results show that 19 countries have time preference rates of less than 0.96 out of a sample of 22 MFI economies. A lower value of the time preference rate indicates that households in an economy are more impatient and prefer current consumption over future consumption. On the other hand, the results for LFIs show that no country has the value of 0.96 the standard bench mark used in the previous literature. In this group, 22 countries have time preference rates of less than 0.9 out of a sample of 29 economies. One possible reason for this widening gap in time preference rate for LFIs is the lower level of per capita consumption in these economies. Fredrick et al. (2002) report wide variability in the estimates of time discount factors from 0.02 to more than 1.05. Some lower end estimates observed in the current study for countries namely Burkina Faso, Ghana and Dominic Republic are supported by lower limit provided by Frederick et al (2002). In addition, Wang et al. (2016) recently analyze country level variations of time preferences in terms of waiting tendency and find a higher degree of variation across countries from 8% in Nigeria to 89% in Germany. A higher value of the time preference rate indicates that people generally wait for a longer period of time and prefer to consume in the future. We use three different values of time preference rates in constructing four alternative *time series* measures of welfare gains. [107]

106 We provide the detailed discussion of the patterns of consumption along with welfare gains within countries over time in the next Chapter.

107 On the whole, four countries out of the two samples of 51 economies have time preference rate of more 1. These countries include Egypt and the Philippines from MFIs group and Senegal and Bolivia belong to LFIs category. As mentioned in Becker and Mulligan (1997), the value of the time preference rate may exceed unity depending on the individuals' willingness to spend more resources to accurately predict the future.

4.2.2 Capital's share(α)

We derive the country-specific value of implied capital share defined as one minus labour share to measure the ratio of welfare gains in terms of consumption under integration relative to autarky. As mentioned in the previous chapter, we extract labour share from PWT version 8. It estimates share of labour income in GDP of each country. Appendices 5A and 5B present details of the capital share in output for MFIs and LFIs used for computing autarky level of consumption. Overall capital share in output is not only different across countries, it also varies over time. For example, in MFI group Korea and Peru have a capital share of 0.33 and 0.42 in 1961 and it increases to 0.46 and 0.7 in 2010 for two countries respectively. In the LFIs category, Gabon's capital share was 0.54 in 1961. It goes up by more than 35% to 0.74 in 2010. These figures clearly indicate the changing patterns of capital share and may signal a sort of structural transformation in most economies over time. Inkalaar and Timmer (2013) also observe that labour shares decline considerably over time which indicates a corresponding increase inimplied capital share. As mentioned earlier, the stability of the labour share in income constitutes one of the key characteristics of Kaldor facts used to explain models of economic growth. Following Ngai and Pissarides (2007), we consider that structural change occurs due to reallocation of labour across various economic sectors of an economy. They emphasize that this sectoral shift of labour from agriculture to manufacturing to services sector is significant in most economies over time. Given this background, it appears quite plausible to argue that the structural transformation has broad implications for macroeconomic dynamics and results in declining labour share in most emerging and developing economies. The corresponding rise in implied capital share is widely different than the common standard benchmark of 0.3 assumed in most studies measuring welfare gains from international financial integration.

Appendix 5A also reveals some interesting cross country variation in the implied capital share of MFI economies. In this group, the mean capital share is highest for Egypt and lowest for India. Egypt's average capital share in output is as high as 0.64 while India's capital share is 0.35. India's capital share fluctuates widely from less than 30% to more than 50% for the period 1961-2010. Egypt's capital share is higher than Singapore. Singapore's share of capital in output falls marginally from 60% to 56% while Egypt's capital share remains more or less stable at around 65% of income for the period 1961-2010. These trends perhaps indicate that the assumption of a constant capital share is not plausible and variation in it affects rate of return to capital which contributes to different levels of welfare gains within countries overtime.

The change in implied capital share is more significant for the LFIs over time (Appendix 5B). The mean capital share of Togo is 0.14 which is more than 50% lower than the standard benchmark of 0.3 used in previous studies measuring welfare gains. On the contrary, Botswana a less developed and less financially integrated country of Africa has the highest share of capital in output. This share even exceeds the share of some emerging economies belonging to the MFIs group. Its maximum value is 0.75 and minimum value is 0.62 which is more than 100% of the value of 0.3 frequently used in literature. Table 10 shows MFIs and LFIs with the lowest and highest value of capital's share in output based on mean values and provides an extent of difference of the country-specific values from common values used in previous studies.

Table 10: Capital share in output for MFIS and LFIs to compute autarky level of consumption

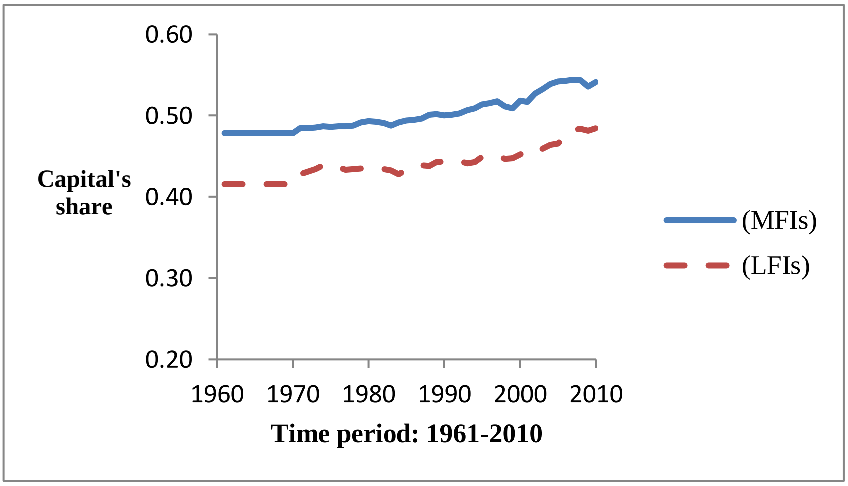
Countries with lowest share of capital in output				
No	**MFIs**	**Value**	**LFIs**	**Value**
1	India	0.36	Togo	0.15
2	Korea	0.41	Sri Lanka	0.24
3	Israel	0.41	Burundi	0.26
4	South Africa	0.42	Kenya	0.28
5	Malaysia	0.43	Bangladesh	0.29
Countries with highest share of capital in output				
No	**MFIs**	**Value**	**LFIs**	**Value**
1	Egypt	0.65	Botswana	0.73
2	Turkey	0.64	Ecuador	0.71
3	Venezuela	0.59	Gabon	0.63
4	Mexico	0.58	Senegal	0.62
5	Singapore	0.57	Nigeria	0.61

Source: Calculations based on PWT 8.

Furthermore, very few studies explain reasons behind the decline in labour shares and corresponding rise in implied capital share across countries. Karabarbounis and Neiman (2013) investigate this issue and find that the fall in the price of investment goods relative to consumption goods especially in the early 1980s has contributed in the decline of labour share across countries. This makes capital especially information and technology cheaper than consumption goods. They also argue that the larger the fall in the price of investment goods in countries or industries, the larger the fall in the size of the labour share. It appears that countries such as Egypt and Singapore have experienced relatively modest decline in the prices of investment goods relative to consumption goods while economies of India and Korea may have experienced a large fall in the price of investment goods relative to consumption goods leading to the decline in the labour share.[108]

Figure 9 below shows capital's share in output for MFIs and LFIs for the period 1961-2010. As is visible from the figure, the share of capital in output in both groups of countries remains higher than 0.4 through this period. We find the range of capital share for MFIs between 0.48 and 0.54. This range for LFIs lies between 0.42 and 0.48. This is also consistent with the findings of Piketty (2014) who documents that the share of capital in national income is increasing and that of labour is declining especially since the year 2000.[109] The limitation of constant capital share has been pointed out in many studies but has not been considered in welfare calculations of the integration literature.

Figure 9: Capital share in output for MFIs and LFIs



Note: This figure shows time varying implied capital share in output for MFIs and LFIs for the period 1961-2010 based on the data of labour share obtained from (PWT) 8.

Contrary to the previous studies, we extend the welfare calculations beyond standard "one- size-fits- all" labour share and incorporate time series of implied capital share to seek more insights about welfare responses to changes in the structure of the economy.[110] Ngai and Pissarides (2007) emphasize the significance of structural change characterized by the changing labour shares in different sectors of an economy. Capital share in output also affects welfare calculations. Mankiw et al. (1992) also highlight that the predictions of the neoclassical

108 Karabarbounis and Neiman (2013) also identify some other reasons for this decline in the labor share which include within industry changes and industrial composition. The data for price level of capital formation and consumption available in PWT version 8 also shows that the decline in price of capital formation relative to price level of consumption in Korea is higher than Singapore over time. In case of India, this declining trend starts in the 1990 and continues afterwards (PWT version 8).

109 Blanchard et al (1997) and Lawrence (2015) observe similar trends in Western European countries and USA as well.

110 In this analysis, we believe that since parameters under considerations are macroeconomic in character and affects macroeconomic landscape of economies, a change in their composition and values also changes the structure of the economies

growth framework are more reliable with variable value of capital share rather than its fixed value. GJ and Hoxha et al. (2013) use implied capital share derived from labour shares constructed by Gollin (2002). Based on Gollin's calculations, the former uses average value of 0.3 of implied capital share which range from 0.2 and 0.4 for neoclassical production structure. The latter employs two values of capital's share in output in calibrated models which are 0.3 and 0.4. GJ also point out the limitation of using constant share of capital in output and consider it too strong in measuring welfare gains. The results of capital share in Appendices 5A and 5B show the capital share varies for almost every country and reinforces the argument of incorporating time-varying capital share in measuring welfare gains. Variable share of capital in output is particularly relevant for the current study to construct time series of welfare gains.

4.2.3 Depreciation of capital stock (δ)

We obtain depreciation rate of the capital stock from PWT 8.0. Appendix 6A provides the details of the depreciation rates of MFIs. It shows that Argentina, Brazil and China, which belong to MFIs have the mean depreciation rate which is lower than even 3.5%. On the other hand, in the group of LFIs, the economy of Burundi shows the lowest depreciation rate of 2.8% while Senegal and Dominic Republic each follows with the rate of around 3% (Appendix 6B). These figures highlight that the assumption of 6% depreciation rate is almost double the average rate for many MFIs and LFIs which prevails at around 3%. Out of sample of 22 MFIs, only two countries such as Egypt and India reflect a mean depreciation rate of more than 5%. Similarly, only two countries namely Botswana and Gabon out of a total of 29 LFIs indicate a depreciation rate of more than 5%.

Overall, this depreciation rate varies across countries and over time unlike some previous studies which finds it common across countries and over time (Caselli, 2005). Korea, an MFI economy has a depreciation rate of less than 3% in 1961. The depreciation rate in Korea increases to more than 4% of the capital stock in the year 2010. On the other hand, in case of Botswana, an LFI economy the depreciation rate fluctuates in the range of 3% to 6.7%. Table 11 presents depreciation rates for some of the economies having lower depreciation rates of capital. The depreciation rate of all countries reported in the Table 11 are less than the benchmark value of 6% used in previous studies to measure welfare gains of international capital flows.

Inklaar and Timmer (2013) describe that depreciation patterns are different because constituents of investment differ across countries as well as over time. As mentioned in the previous chapter, in sharp contrast to standard approach, they measure depreciation rates by dividing total investment into assets instead of assuming it a homogeneous asset.

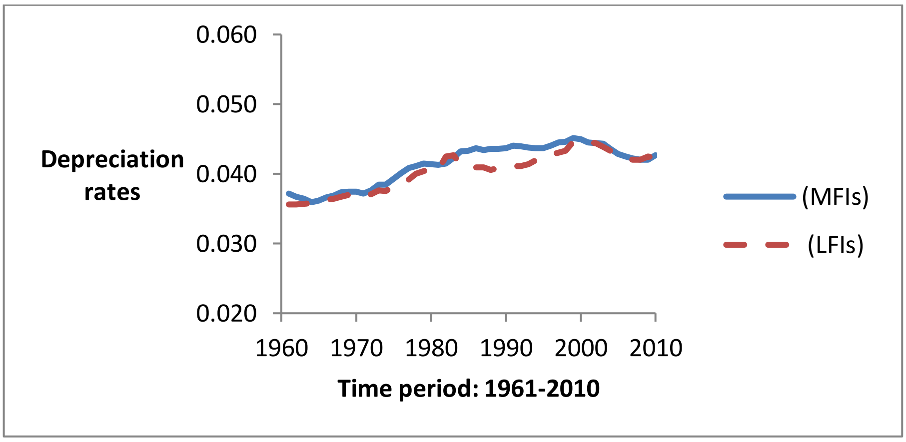
Table 11: Lowest depreciation rates for MFIs and LFIs to compute autarky level of consumption

No	MFIs	Value	LFIs	Value
1	China	0.029	Burundi	0.028
2	Brazil	0.032	Senegal	0.033
3	Argentina	0.033	Dominic Republic	0.033
4	Venezuela	0.033	Togo	0.033
5	Hong Kong	0.037	Niger	0.034

Source: Calculations based on PWT 8

Moreover, they do not make use of the assumption of the steady state and consider starting capital output ratio as the initial capital stock. Previous studies on welfare gains use constant depreciation rate of capital stock of 6% from to the US economy in welfare calculations (GJ & Hoxha et al, 2013). In addition, (Mankiw et al. 1992, p. 410) point out the limitation of available data "that would allow us to estimate country-specific depreciation rates. However, given the varying depreciation patterns across countries observed in PWT 8, it is not plausible to assume that all countries have constant depreciation rates over the years. We use depreciation rates from PWT 8 which considers implications of more detailed investment data to construct *time series* of welfare gains. Figure 10 shows depreciation rates for MFIs and LFIs for the period 1961-2010.

Figure 10: Depreciation rates for MFIs and LFIs.



Note: This figure shows time varying depreciation rates for MFIs and LFIs for the period 1961-2010 based the data obtained from PWT 8.

It shows that though depreciation rate of the total capital is not widely different across MFIs and LFIs for many years, the latter group experiences lower depreciation as compared to the former. As capital stocks depreciate more rapidly in higher income countries compared to lower income countries, MFIs have higher depreciation rates than LFIs. Overall, no country included in the list of MFIs and LFIs shows an average depreciation rate of 6% typically assumed in the integration and welfare literature.

4.2.4 Total factor productivity growth (g)

We compute autarky consumption from the Euler equation (3.5) and subsequently measure country-specific welfare gains. Equation (3.5) illustrates that economy discounts future consumption with time preference rate (β) and growth rate of technology (g). We extract data on TFP growth from the PWT version 8 to analyze time-varying impact of productivity on welfare gains.[111] It provides comprehensive information about productivity which can be used to compare TFP growth within a given country over time. It is measured at constant national prices with the base year set to 2005.[112] Appendix 7A provides details of productivity growth for MFIs while Appendix 7B shows productivity growth in LFIs. As mentioned earlier, there has been significant decline in labour share across countries which indicate a corresponding rise in implied capital share. Inklaar and Timmer (2013) point out this trend of decline in labour share is critical for "estimates of productivity growth and comparative productivity levels".

Overall, countries such as South Africa, Venezuela, and Philippines perform well in terms of productivity growth. However, a closer look at productivity growth rates within countries reflects wide variation over the years. Argentina, China, Venezuela, Hong Kong and Peru are the five best performing economies in terms of productivity growth since the year 2005. Argentina experiences an average TFP growth of more than 13% followed by Chinese economy which grows by an average of more than 12% over the last five years. In the year 1961, TFP growth in Argentina was lower by more than 4% from the base year 2005. In case of China, it was lower by more than 60%. Sri Lanka is the best performing economy in terms of productivity growth in LFIs category followed by Dominic Republic and Panama over the last five years compared with the base year of 2005. Sri Lanka's average productivity growth is more than 10% from 2005-2010 compared with the base year in 2005. In the year 1961, it was almost 50% lower than base year 2005. This indicates anincrease in productivity growth in Sri Lanka for the period 1961-2010. During the same period, average productivity growth in Dominic Republic and Panama is 7% and 6% respectively. In Dominic Republic productivity growth fluctuates and increases by more than 20% compared with the base year before 2005. It is regarded as one of the best performing economies in terms of high growth

111 GJ and Hoxha et al. (2013) use the terms productivity growth and growth rate of technology respectively. In the current study, we use these two terms interchangeably.
112 In measuring TFP growth, Inklaar and Timmer (2013) use the US economy as the base economy such that all countries i are compared to $j = USA$. They also conduct empirical estimations with the multilateral input index following Caves et al (1982a, b) and obtain similar results.

rates in Latin America and Caribbean over the last 25 years.[113] These figures clearly reflect marked variation in TFP growth within countries over the years.

Inklaar and Timmer (2013) also explain that labour productivity growth across the world economy undergoes an enormous change from less than 2% on average before the 1980s to more than 2.5% since2000 onwards. An interesting feature of this productivity growth indicates that while it is contracting in high income advanced economies, it is expanding in emerging and developing countries. Over the last three decades 1980-2010, productivity growth in rich countries falls from 1.7% to 1.2% per year. During the same period, it rises in poor countries from 2.5% to 5.5% per year (Inklaar and Timmer, 2013).

The previous studies on welfare gains ignore changes that occur in total factor productivity and thus perform welfare calculations at a point in time. We extend welfare analysis beyond average implications and incorporate productivity differences across countries for welfare calculations since the trends of productivity change over the years. It is important because many countries included in our sample are developing countries of Africa and Latin America especially in the group of LFIs. The effects of productivity growth are different for these economies as they enjoy the "advantage of backwardness" because of technology adoption and diffusion (Keller, 2004; Griffith et al, 2004). Moreover, it is considered that technology is an important determinant of productivity and income differences across countries which is better explained by productivity differences (Easterly and Levine, 2001). This argument may be linked with the Kose et al. (2006) who suggest collateral benefits of international capital flows which contribute tothe productivity growth of economies. There is also empirical evidence that financial integration raises productivity growth in an economy (Edwards, 2001 and Bonfiglioli, 2006). Thus, the use of a constant value of this parameter may not better explain patterns of welfare gains in developing and emerging economies since it not representative of the whole sample.

The preceding discussion about main parameters specified in the theoretical framework shows that their country-specific values are different compared to the common values used in the previous literature to measure welfare gains. The four key parameters which are discussed in detail include time preference rate, capital's share in output, depreciation rate of capital and TFP growth. These estimated and extracted parameters provide more relevant information to explain patterns of consumption behaviour, outputs, and productivity growth within a country

113 This country-specificinformation is obtained from World Bank Country information: http://www.worldbank.org/en/country/dominicanrepublic

over time. The previous literature on welfare gains from international financial integration employ constant values of these measures for making welfare comparisons across countries at a point in time. Inklaar and Timmer (2013) caution against employing common and constant parameter values in examining cross country income differences. We, therefore, argue that it is important to consider country-specific parameters in order to better understand the implications of international financial integration on growth and welfare of economies over time. In addition, the time series of these parameters in PWT version 8 allows for the construction of the time-varyingwelfare gains and their comparisons within a country over time. We consider that each developing economy follows the Euler equation (3.5) and use actual parameter values to compute time series of consumption under autarky. We measure welfare gains expressed as a ratio of consumption under integration (actual consumption) relative to consumption under autarky (derived consumption) to obtain more insights about the argument that capital mobility from capital abundant rich countries to capital scarce poor countries contribute in economic growth and welfare of developing countries overtime.

4.3 Rate of return to capital

Before we start the discussion onwelfare gains, it is important to explain the role and method of calculating the rate of return to capital and capital output ratios in measuring welfare gains. We see from the basic insights of growth discussion in Chapter 2, that the rate of return on savings is determined by the stock of capital in an economy. Consumption decision, on the other hand, entails that the amount of income saved by the households also depends on the rate of return to savings. Both these neoclassical arguments of Solow (1957) are incorporated in the RCK model together. Given Cobb-Douglas production function (3.2), the rate of return on the unit capital is defined as follows:

$$R_{t+1} = \alpha \hat{k}_{t+1}^{\alpha-1} + 1 - \delta \qquad (4.1)$$

It says that rate on unit capital is equal to the marginal product of capital plus 1 minus δ which is the depreciation term and “1” appears because it is the gross return in the above expression. [114] The neoclassical economic model implies that the economy converges to the balanced growth path very rapidly in autarky. One of the conditions of balanced growth is that the rate of return on capital is constant over time. This is also one the stylized facts of growth established by Nicholas Kaldor in 1957.

114 We provide details of equation (4.1) and (4.2) in the Appendix 2. Appendix 2 explains the derivation of the Euler equation (3.5) in the light of the framework developed by GJ and Hoxha et al. (2013).

Following, Hoxha et al. (2013), the return of return can be calculated as follows:

$$R_t = 1 - \delta + \alpha \frac{Y_t}{K_t} \quad (4.2)$$

R_t is the rate of return in year t, δ is depreciation, and α is capital's share in output. Y_t shows the output in year t and K_t is the amount of capital. It shows the share of capital in output times the output capital ratio. The assumption of the balance growth path requires that share of output paid to capital is roughly constant over time. For the rate of return to be constant over time, output capital ratio must also be constant which implies that capital and output grows at the same rate.

While we compute the rate of return to capital in the light of neoclassical growth model, we also use additional arguments of relevant growth literature. Equation (4.2) states that the return to capital depends on share of output going to capital and depreciation. The evidence of balanced growth path is perhaps more relevant for advanced economies, but it is less compelling for developing economies (Kongsamut et al, 2001 and Papell and Prodan, 2014). These studies highlight the role of systematic and structural changes which occur in less developed countries and affect macroeconomic conditions. Moreover, Acemoglu and Guerrieri (2008) demonstrate that factor proportion differences across economic sectors result in non-balanced growth. The question of why rates of return are different across countries over time requires information about country-specific capital share in output and depreciation of the capital stock. Inklaar and Timmer (2013) explain that operationalizing these differences about growth comparisons within countries over time goes back to Solow (1957) and Jorgenson and Griliches (1967) in contrast to the analysis across countries at a point in time (Caves et al, 1982). Finally, Coeurdacier et al. (2013) investigate the significance of a country size in welfare calculations and emphasize the differences which exist between small countries and potentially large emerging economies. These arguments allow for the calculation of the rate of return based on country-specific capital share and depreciation rate of the capital stock. We use time series of implied capital shares and depreciation rates to compute the rate of return to capital.

Furthermore, we calculate K_t by perpetual inventory method using investment data from the PWT 8 following GJand Hoxha et al. (2013).[115] Hoxha et al. (2013) use equation (4.2) to calculate initial rate of return in 1960 and construct the time series data on the rates of return for subsequent years in exactly the same manner using output and capital stock of the given

115 GJ and Hoxha et al. (2013) both construct capital stocks using perpetual inventory method explained in Bernanke and Gurkaynak (2001).

year. They, however, assume a constant value of α and δ. We extend the analysis and include time-varying country-specific values of α and δ. Moreover, Hoxha et al. (2013) use this time series of rate of return to justify the argument of slow convergence to include elements of endogenous growth of imperfect substitution of capital varieties in neoclassical economic model. We use this time series of rate of returns with varying α and δ in the Euler equation (3.5) for technological change for constructing autarky path of consumption.[116]

$$\hat{c}_{t+1} = \hat{c}_t \frac{(\beta R_{t+1})^{\frac{1}{\sigma}}}{1 + \mathrm{g}}$$

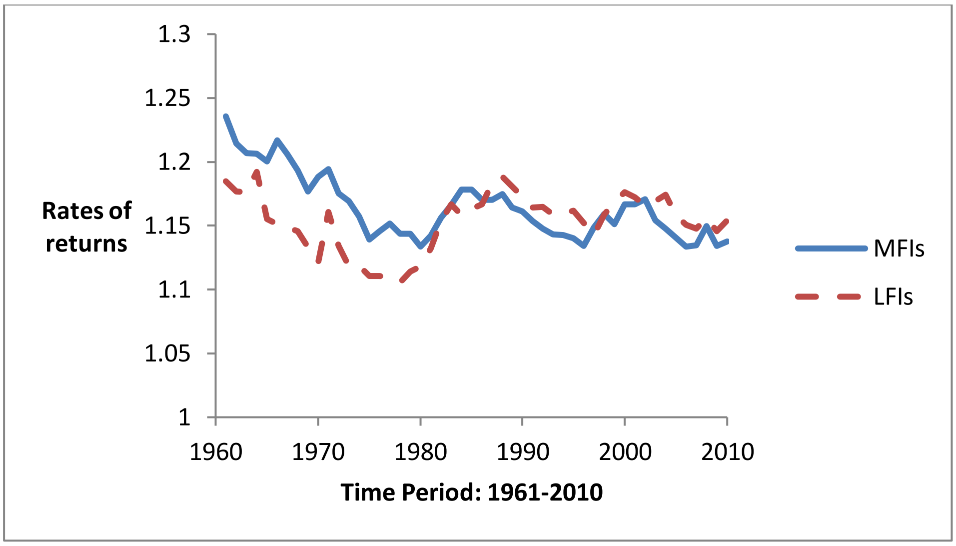
While we compute the rates of return using equation (4.2), we assume that the domestic rates of return remain higher than world rate of return to allow capital abundant rich countries to lend to capital scarce poor countries.

We provide the details of rates of return for all MFIs and LFIs in Appendices 8A and 8B. The average value of computed rates of return with time-varying α and δ exceed the bench mark of 1.0542 which is the world rate of return used in the previous literature (GJ & Hoxha et al, 2013). Country-specific values of these rates of return are also widely different with each other. Countries such as Egypt, Turkey and Indonesia have average rates of return to capital of more than 1.5 for some years. Similarly, the calculated value of average annual rates of return for LFIs exceeds the benchmark value for 26 countries in a sample of 29 economies. It is higher than 1.5 for many economies within this group for many years. This raises the question of how gradually this rate of return converges to the world rate for a specific country. The previous literature calculates welfare gains using the assumption of small economy under steady state condition (GJ & Hoxha et al, 2013). We compute time series of rates of returns to obtain more insights and intuition regarding welfare patterns within countries over time.

Figure 11 shows the trend of the rates of returns for the two groups of countries. This rate of return is higher in MFI economies relative to LFIs till the year 1980. After this period, this rate rises in both groups till 1985. However, after 1985 it is fluctuating in MFI economies, but it has not reached the 1985 level again. This is perhaps because of the liberalization of capital account in most MFI economies during this period. Henry (2007) explains that most liberalization episodes in emerging economies occur during the period 1986-1993.

116 Following Hoxha et al. (2008), we consider that each country follows the Euler equation (3.5) and use the computed value of rates of return to derive consumption under autarky.

Figure 11: Observed rates of return for MFIs and LFIs



Note: This is computed by authors based on the data obtained from (PWT) 8.

It also appears from Figure 11 that the rates of return to capital remain higher than the benchmark world rate of return for the two groups of countries throughout the period 1961-2010. We use time series of observed rates of return based on actual country-specific time series of α and δ as well as output and capital to construct time series of welfare gains.

4.4. Capital output ratio

Welfare gains of international capital flows depend on the initial capital output ratio. A country with the lower capital output ratio is expected to benefit more from international financial integration. GJ express welfare gains as a function of the initial capital output ratio. In order to construct capital stocks, they employ the perpetual inventory method in the light of the framework developed by Bernanke and Gurkaynak (2001) and compute three capital output ratios based on these capital stocks for 82 non-OECD countries. For this purpose, they use the investment data for the year 1995 from Hesten, Summers and Aten (2002) PWT version 6.1. The median capital output ratio which they determine is 1.4. A country at the 10th percentile has a capital output ratio of 1 while the one at the 90th percentile has a capital output ratio of 2.1. Hoxha et al. (2013) use the same values of capital output ratios in their calibration analysis. Inklaar and Timmer (2013) construct capital output ratios over time and assume an initial capital output ratio for the first year based on the available data to distinguish it from the steady state method which requires capital and output to grow at the same rate. Using this argument, we follow Bernanke and Gurkaynak (2001) to calculate country-specific capital output ratios over time to investigate the patterns of implied welfare gains. Thus, we look at each year from 1961-2010, calculate the actual K/Y ratios for those years, and analyze the welfare gains implied for those years expressed as a ratio of consumption under integration relative to autarky.[117]

Table 12 reports selected countries within two groups with the highest and lowest average capital output ratios. Argentina enjoys the highest mean capital output ratio of 4.01 in MFIs while Egypt has the lowest ratio of 1.37. In LFIs, Niger's average capital output ratio is 4.48 followed by Tunisia while Panama has the lowest capital output ratio of 1.51. Appendices 9A and 9B provide details of capital output ratios of MFI and LFI economies respectively.

Table 12: Capital output ratios of MFIs and LFIs

MFIS and LFIs with highest capital output ratios							
MFIs	**Mean**	**Maximum**	**Minimum**	**LFI**	**Mean**	**Maximum**	**Minimum**
Argentina	4.01	5.00	2.49	Niger	4.49	8.96	2.57
Singapore	3.86	5.32	1.70	Tunisia	4.02	5.73	1.30
Thailand	3.73	5.44	2.30	El Salvador	3.97	5.43	2.43
Peru	3.65	6.00	2.29	Ecuador	3.89	5.26	2.18
China	3.44	4.93	1.31	Botswana	3.60	10.72	0.81
MFIS and LFIs with lowest capital output ratios							
MFIs	**Mean**	**Maximum**	**Minimum**	**LFIs**	**Mean**	**Maximum**	**Minimum**
Egypt	1.37	2.68	0.56	Panama	1.51	2.43	0.43
Turkey	1.56	2.17	0.98	Guatemala	1.52	2.06	1.04
India	2.10	3.12	1.66	Costa Rica	1.77	2.46	0.94
South Africa	2.21	2.98	1.61	Burundi	1.83	4.21	0.41
Mexico	2.28	3.27	1.54	Côte d'Ivoire	1.96	4.67	0.63

Source: Calculations based on PWT 8 for the years 1961-2010

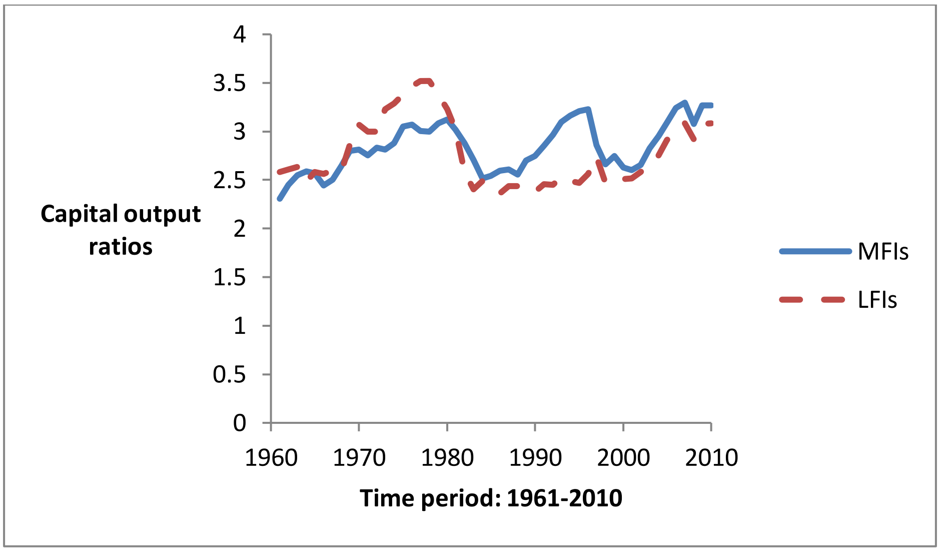
A closer look at capital output ratios over time reveals that countries such as Niger and Botswana report very higher capital output ratios which may be due to the uneven growth patterns observed at various points of time. Niger has a capital output ratio of more than 7 while Botswana has capital output ratio of more than 10 for few years. Inklaar and Timmer (2013) also report very higher capital output ratios close to this range and show that fluctuations in GDP during various transition periods lower GDP in certain economies and result in higher capital output ratios.

Figure 12 explains the time series perspective of capital output ratios for the two groups of countries. An interesting feature of this figure shows that while country-specific capital output ratios vary, on an average this ratio follows more or less similar patterns across the two groups. Capital output ratios for the MFIs lies within the range of 2.30 to 3.29 while for the LFIs it lies between 2.36 to 3.51. The figure also illustrates that LFI economies have higher

117 Capital stocks for MFIs and LFIs were constructed using the perpetual inventory method explained in Bernanke and Gurkaynak (2001). For example, the initial capital stock in 1960 is calculated as follows: $K_{1960}= I_{1961}/(g+\delta)$. g is the10 year growth rate of GDP and δ is the depreciation rate. Data on investment, output and the country-specificdepreciation rate is obtained from PWT 8. Since we are constructing capital output ratios over time, we take the average growth of real GDP g for all fifty years.

capital output ratios before 1980s and lower capital output ratios after this period compared to emerging MFI economies. This pattern points to the various factors noted in Prasad et al. (2003) such capital flight from Latin American economies in the 1970s despite capital account restrictions and lower level of capital inflows in African economies even with less restrictions on the capital account. These factors may have contributed in lowering GDP and corresponding rise in ratios for LFIs before 1980s. In addition, fall in the capital output ratios in subsequent years after 1980s indicate that LFI economies are more capital scarce compared to MFI countries.

Figure 12: Capital output ratios for MFIs and LFIs.



This is computed by authors based on the data obtained from (PWT) 8.

It appears from the trend that the capital output ratio is not constant over time assumed in growth literature based on Kaldor facts. These stylized facts are less convincing for countries other than the US (Kongsamut et al, 2001). We consider capital output ratios over time more appropriate and plausible to analyze time series of welfare gains for emerging and developing economies.

We measure welfare gains expressed as a ratio of consumption under integration relative to autarky. We use actual data of consumption per capita from the PWT version 8 and assume it as consumption under integration. It is more appropriate to consider the reported *actual consumption* per capita to be consumption under integration becauseit accounts for actual dynamics of respective economies under consideration. The implied welfare gains indicate a country's current level of consumption relative to autarky level of consumption. We summarize this measure in, μ, defined as *observed* level of a country's consumption that shows a welfare improvement in the economy from international capital flows in each year relative to autarky. GJ explain welfare gains in terms of the Hicksian equivalent variation which shows percentage increase in an economy's level of consumption that brings welfare in a domestic economy if it were to be completely autarkic up to the level of welfare under integration. Previous studies predict consumption under integration with common parameters values across countries at a point in time[118.]

We compute *autarky* consumption from Euler equation under financial autarky (3.5) derived from RCK neoclassical model. Euler equation (3.5) under financial autarky is considered suitable to determine autarky paths of consumption since it discounts current consumption with time preference rate as well as the growth rate of technology. GJ and Hoxha et al. (2013) numerically solve for the optimal path of the consumption to predict consumption under autarky.[119] We construct time series of welfare gains using equations (3.5) and (3.17) which are discussed in the next section.

4.5 Discussion of welfare calculations

The previous sections explain in detail the role of parameters in measuring welfare gains. This section discusses the results of welfare calculations. It documents, analyzes and compares the trends of welfare gains within countries over time. It also highlights the regional welfare outlook and further classifies MFIs and LFIs into regional groups to seek better insights about the conditions and factors affecting the size of welfare gains. The current study measures welfare gains by using country-specific parameter values not considered in previous studies and constructs four alternative time series of welfare gains to provide a more detailed perspective of how international financial integration contributes in welfare gains. Appendices 10-17 provide details of *country-specific* welfare gains for the two groups of countries analyzed in the current study.

4.5.1 Trends of welfare gains in MFIs

We present the results of four cases of welfare gains for MFIs which constitute a group of 22 economies in appendices 10-13. Appendix 10 reports the results for Case 1 of MFI group. In this Case, we assume a fixed value of time preference rate β similar to previous studies but use *country-specific* values of remaining parameters for computing consumption under autarky and measure welfare gains as a ratio of consumption under integration relative to autarky. These

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118 Though Hoxha et al. (2008) have taken actual consumption for some of the countries, this study has not developed the time series perspective of welfare gains as it was extending the work of GJ. In addition, we aim to use the level of welfare gains to investigate its short run and long run relationship with trade channels. Therefore, we measure welfare gains as a ratio instead of a percentage change.

119 Numerical solution for optimal path of consumption is more relevant when welfare gains are measured at a point in time.

parameters include capital's share in output, depreciation rate of the capital stock, and total factor productivity growth. We present results for Case 2 in Appendix 11. In Case 2, we assume country-specific value of time preference rate in terms of discount factor calculated from actual real interest rates and continue with parameter values specific to each county from Case 1 to compute consumption under autarky and measure welfare gains. The results for Case 3 are reported in Appendix 12. This measure of welfare gains considers autarky consumption computed with the estimated value of time preference rate β obtained for each country using the 2-SLS approach and considersremaining parameters specific to each country similar to the first two cases. Finally, we describe the results of Case 4 in Appendix 13. In this case, following Hoxha et al. (2013) we measure welfare gains by making another assumption about the substitution parameter. It allows to incorporate elements of endogenous growth in the neoclassical economic model. We assume a fixed value of time preference rate but use *country-specific* values of remaining parameters. In the first three cases, following GJ, we implicitly assume the value of the substitution parameter ϵ =1 under which capital types are considered perfect substitutes. In this last case, we assume the value of substitution parameter $\epsilon < 1$ under which capital varieties are regarded as imperfect substitutes. These four cases are discussed in detail in the methodology. In sub-sections (i)-(iv), we analyze the results of four cases of welfare gains to provide a detailed perspective and develop comparisons with the previous literature. Subsection (v) provides the overall summary of the four cases.

i. Case 1: Computation of time-varying welfare gains with given time preference rate $(\boldsymbol{\beta})$

The results of Case 1 suggest that 12 countries out of a sample of 22 MFI economies exhibit more than two times observed level of consumption relative to autarky in different years between 1961-2010.[120] Moreover, out of these 12 countries, average annual welfare gains expressed as a ratio of actual consumption relative to autarky exceed by more than two times in 3 economies namely Brazil, Peru and South Africa for the years 1961-2010.[121] Appendix 10 provides the results for Case 1.

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120 We will further discuss about these periodic gains in later section on regional welfare perspective.

121 Our welfare benchmark of gains from international capital flows is different from the previous studies of integration literature. GJ calculate welfare gains at a point in time for the year 1995. They set the benchmark of 2% of annual consumption which occur when capital output ratio for a country is less than 1.29 or greater than 4.38. This welfare benchmark estimate is determined by analyzing welfare gains as a function of the initial capital output ratio. In the current study, we are interested in constructing the time series of welfare gains. The ratio of welfare gains reflects a welfare level in terms of actual consumption relative to autarky for each year. Following GJ, we assume that actual consumption under integration must be higher than autarky level of consumption for realizing positive welfare gains. In the current study, observed level of consumption remains higher than the derived autarky consumption. We, however, focus on welfare patterns reflecting an observed level of consumption

The results in Appendix 10 show that actual annual consumption in Brazil exceed by more than two times relative to annual autarky consumption for the period 1968-1988. Brazil's average annual capital output ratio is 3.30 but its range lies between 2.25 to 4.70. Its capital output ratio exceeds 4 for many years between 1968-1988. However, in Peru we find that observed level of consumption relative to autarky remains lower than the benchmark welfare level of 2 when capital output ratio exceeds 4. The capital output ratio for the overall time period 1961-2010 lies between 2.29 to 5.99 in the Peruvian economy. Itexperiences severe recession during the period 1988-1993 which led to introduction of the International Monetary Fund (IMF) stabilization programs in the country between 1990-1997.[122] This may have improved capital output ratios in the economy without corresponding increase in actual consumption per capita relative to autarky. These results perhaps support our *a priori* argument that there are gains from international financial integration, but these gains are different for different economies based on country-specific conditions and environment.

We, however, observe a different phenomenon in the patterns of welfare gains in South Africa. Welfare gains in South Africa exceed by more than two times of actual annual consumption relative to autarky for nearly two decades from 1963-1981 when the capital output ratio is greater than 2. South Africa's average annual capital output ratio is 2.20 and its range lies between 1.60 and 2.60. During the first two decades 1961-1981, South African economy grows with an average rate of 4.5% per year. In the following two decades 1981-2001, the economy of South Africa grows with an average rate of 1.5%.[123] High growth may have contributed to higher welfare gains in South Africa during the early period of the analysis.

Interestingly and surprisingly, however, annual average welfare gains in terms of actual consumption relative to autarky are smaller for some Asian countries namely China, Hong Kong, Korea and Singapore. As mentioned in the stylized facts, Hong Kong and Singapore are

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which exceeds more than two times relative to autarky. We consider it a realistic benchmark as we are measuring welfare gains of international capital flows and associated impact caused by these flows which are captured in productivity changes, increasing capital share and differences in depreciation rates. We use time series of these parameters in welfare calculations. GJ mention that welfare benefits may go up by more than 50 times than the benchmark neoclassical level of 2% of annual consumption if developing economies are able to reap the benefits of higher productivity and better allocation of resources due to financial integration. This benchmark is equivalent to a welfare ratio of 2 in the current study which implies a two times increase in the observed or actual level of consumption relative to autarky.

As we are using actual data to derive consumption under autarky, welfare gains in terms of percent change fluctuate widely as compared to previous studies. However, we are only focussing on welfare levels as we want to use the time series of welfare gains to investigate the short run and long run relationship of welfare gains with trade channels.

122 This information is obtained from the IMF year book on Peru's road to economic successhttp://www.imf.org/external/np/blog/dialogo/100115.pdf

123 This figure on growth rate is based on the calculations of the PWT. 8.

one of the largest recipients of international capital flows. This may perhaps illustrate the role of some indirect channels pointed out by GJ such as technology diffusion and role of international markets on domestic economic policies which are not properly accounted for in the neoclassical framework.[124] Overall, these results are suggestive of the fact that welfare gains of international capital flows are different across countries and over time. We plot welfare gains of all MFI countries in Appendix 18. The welfare gains for Case 1 are illustrated by the small dotted line labelled as wg1.

ii. Case 2: Computation of time-varying welfare gains with time preference rate ($\boldsymbol{\beta}$) based on real interest rates

In Case 2, we use the country-specific time preference rate in terms of discount factor β. We compute it from real interest rate data using equation (3.18). The results of the computed values of time discount factor are provided in the Appendix 3. While observed level of consumption represents the consumption under integration, we use this value of country-specific time discount factor to compute consumption under autarky from equation (3.5). As discussed in the previous sections, the results show that time discount factor is different for many economies than the standard benchmark of 0.96 used in most studies of integration literature. We extend the welfare analysis and measure welfare gains by computing consumption under autarky with this country-specific time discount factor β. It shows the rate at which people discount future utility. It explains the percentage change by which utility of a household goes up through consumption today instead of consuming in the future.

We present the results of welfare gains measured for Case 2 in Appendix 11. The results obtained indicate that observed level of consumption of 14 countries exceeds by more than two times relative to autarky at different points in time from 1961-2010. Out of these 14 countries, financial integration generates average annual welfare gains of more than two times observed level of consumption relative to autarky in 4 countries namely Brazil, Columbia, Peru and South Africa. In addition, Brazil is the only country in Case 2 which enjoys observed level of consumption in excess of three times relative to autarky from 1972 to 1981. In Case 2, the ratio of annual average welfare gains in Brazil increases from 2 to 2.75 indicating an increase of more than 37% in observed level of consumption relative to autarky. Brazil's time discount factor is 0.7 in Case 2 in contrast to the fixed of 0.96 used in Case 1. As indicated a lower value of β makes people more impatient and makes them consume more today instead of tomorrow.

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124 We will further discuss about the patterns of welfare gains in these economies in a later section on regional welfare analysis.

This increases observed level of consumption relative to autarky and leads to higher welfare gains.

The extension of welfare analysis by using country-specific β provides additional insights about the patterns of welfare gains. Welfare gains increase for economies such as Brazil, Columbia and Peru. The value of β for these economies falls compared to the fixed value of 0.96 used in Case 1. Welfare gains decrease for economies such as China and Venezuela for which the value of β is more than 0.96. Welfare gains for economies in which the value of β does not change remain the same. In the second case, this parameter does not change for six countries which include Argentina, Korea, Malaysia, Mexico, South Korea and Turkey. This shows that countries with higher value of β are considered more patient compared to countries with lower values. More patient countries are expected to grow faster than impatient economies (Becker and Mulligan, 1997). One reason for lower welfare gains in countries namely Malaysia, Mexico, Korea, and to some extent Singapore and Hong Kong is the relative stability of parameters used in measuring welfare gains. These economies experience relatively less fluctuations in their patterns of welfare gains compared to countries which show observed level of consumption by more than two times relative to autarky. This also perhaps illustrates that countries with relatively stable patience levels also experience stable welfare gains. It again lends support to our *a priori* argument that there are gains from international financial integration, but these welfare gains are different for different economies based on country-specific conditions and environment. Welfare gains of all countries in MFIs are plotted in Appendix 18. The gains discussed in Case 2 are illustrated by the dots labelled as wg2.

iii. Case 3: Computation of time-varying welfare gains with estimated time preference rate ($\boldsymbol{\beta}$)

In the third case, we calculate autarky level of consumption and subsequently compute welfare gains by estimating time preference rate β for each country and continue to employ *country-specific* values of remaining parameters as in the first two cases. Appendix 4A describes the results of time preference rate β for each country of the MFI group. The results of welfare gains indicate that observed level of consumption exceeds by more than 2 times relative to autarky in 19 countries out of a sample of 22 MFI countries at different points in time from 1961-2010. Compared with Case 2, the number of countries for which observed level of consumption is more than twice relative to autarky level in different time periods increases from 14 to 19. In addition, 10 countries exhibit average annual welfare ratio of more than 2 as compared to 3 countries in Case 1 and 4 in case 2 over the period 1961-2010. We provide the results of welfare gains measured for Case 3 in Appendix 12.

These results perhaps point to a specific link between welfare gains and patience levels of economies. As mentioned in the theoretical framework GJ assume that there is no uncertainty in the sample of developing economies considered for calibration of welfare gains. We estimate equation (3.19) following Hall (1978) and Mankiw and Campbell (1989) that allows for incorporating uncertainty in the empirical analysis. This is important for the current study because the absence of uncertainty would make consumption and rate of return constant over time. Furthermore, following Coeurdacier et al. (2013) who develop an integrated framework of the two approaches measuring welfare gains from capital accumulation and risk sharing, we consider that international financial integration affects welfare gains across countries and overtime. Given this background, we consider the value of coefficient of lagged consumption as the time preference rate specific to each economy. The estimation of preference parameter by incorporating uncertainty also implies that rate of returns to capital are not constant over time. This is also consistent with Hoxha et al. (2008) who suggests that there are differences in the rates of return which are not eliminated over the limited period of time. We also consider the period 1961-2010 as limited time period in which differences in the rates of return persist across countries.

This link between welfare gains and patience levels of economies suggests that welfare gains are higher in countries where people are more impatient compared to countries where are they are less impatient. In the third case, the use of estimated value of time preference rate results in an increase of welfare gains for many countries compared to the first two cases. The results of the estimated coefficient of lagged consumption as patience parameter also support our *a priori* argument that people are not equally patient across countries. We find that that observed average annual consumption level exceeds by more than two times relative to autarky in 10 economies with estimated country-specific time preference rate β in welfare calculations over the period 1961-2010. In three economies namely Israel, Morocco and Venezuela financial integration generates relatively higher welfare gains in terms of higher observed level of consumption relative to autarky. The estimated results in Appendix 4A show that the value of coefficients of lagged consumption as patience parameter β for Israel is 0.74, for Morocco 0.73 and for Venezuela 0.79. Compared with the benchmark level of 2, the ratio of welfare gains for Israel and Venezuela is 2.27 while for Morocco it is 2.25 which indicates an increase of more than 13%.

GJ and Hoxha et al. (2013) argue that time preference rate β along with productivity growth determines the long-run return to capital. They assume there is no uncertainty in the world. A lower value of the patience parameter increases the rate of return to capital. We compute consumption under autarky from the Euler equation (3.5). As mentioned in the previous chapter, we focus on the role of estimated patience parameter which when multiplied with R_{t+1} in equation (3.5) affect the size of the welfare gains. Furthermore, we highlight the role of re-allocation of labour across economic sectors and its changing contribution in output overtime. If we consider that countries undergo structural changes over time which affect implied capital's share in output, we can construct time series of rate of returns across countries. The current analysis shows that there is a link between welfare gains and patience levels of developing economies which can capture changes in consumption over time. Thus, this theoretical link explained in equation (3.5) shows that estimation of this parameter in contrast to assuming its fixed value for each country underscores its critical role in explaining patterns of welfare gains across economies and overtime. Welfare gains of all countries in MFIs are plotted in Appendix 18. Though these plots of welfare gains look more or less similar to the previous two cases, variation in the size of welfare gains indicate the role of country specificity of patience parameter with respect to respective macroeconomic conditions. The gains discussed in Case 3 are illustrated by the big dashed lines labelled as wg3.

iv. Case 4: Computation of time-varying welfare gains with capital varieties as imperfect substitutes

In the previous three cases, following GJ, it is implicitly assumed that capital varieties within an economy are perfectly substitutable. In such a situation, the value of substitution parameter $\epsilon = 1$, which implies an infinite elasticity of substitution between capital varieties. GJ develop their framework for measuring welfare gains by implicitly using this assumption of neoclassical economic model in which total capital stock in the economy is equal to the sum of different capital varieties. Hoxha et al. (2013) assume that capital varieties within an economy are imperfect substitutes in contrast to the neoclassical economic model. This allows for the value of substitution parameter $\epsilon < 1$ and subsequently the value of elasticity of substitution to be less than infinity. In the fourth case, we attempt to measure welfare gains following Hoxha et al. (2013) and assume the value of substitution parameter $\epsilon < 1$. This assumption allows to integrate elements of endogenous growth into the neo-classical economic model of consumption and savings.[125] This mechanism slows the speed of convergence of domestic rates of return to the world rate compared to the neoclassical model which implies fast convergence of rate of return to capital in steady state. We keep the time preference rate fixed and use remaining parameter values specific to each country as in Case 1.[126] Appendix 13 presents the results of welfare gains from international financial integration for Case 4.

The substitution parameter is specified by Hoxha et al. (2013) in a CES production function (3.6) for capital types with the condition $\alpha < \epsilon \leq 1$.[127] α is the share of capital in output and ϵ is the coefficient of the CES production function for capital types. In their framework, they assume, when capital is not perfectly substitutable as in equation (3.6), share of capital in output α and elasticity of capital in output α/ϵ are not equal to each other. This breaks the link between capital's share and capital elasticity in contrast to the standard neo-classical settings. They further explain that the central planner observes the rate of return being equal to α/ϵ times $\frac{Y_t}{K_t}$ instead of α times $\frac{Y_t}{K_t}$ as is predicted in the neoclassical economic model.[128] It is mentioned in their framework but is not considered for computing the rate of return to measure welfare gains.

While we are not interested in investigating the link between capital's share and capital elasticity in the current study, we want to use this argument to examine how rates of return computed through this process affect welfare gains. When capital varieties are not perfectly substitutable, the marginal product of any single type of capital may be less sensitive to total capital stock in the economy but is not completely insensitive to it. Hoxha et al. (2013) also highlight this argument and measure welfare gains by separating capital's share in output and elasticity of output with respect to capital. They consider Grossman and Helpman (1991) and Romer (1990) product variety model based on the assumption that a single firm in a monopolistically competitive market structure produces each capital variety. In their framework, firms operating in this form of market structure act as identical producers and consider the given total stock of capital in their optimizing decisions. These firms use units of the final goods to produce capital varieties. The implication of this assumption is that each firm

125 The neoclassical growth model assumes that capital varieties are infinitely substitutable. The endogenous growth theory, on the other hand, requires that substitution between capital varieties is extremely low. Hoxha et al. (2013) develop their framework for measuring welfare gains in an intermediate setting which allows integrating elements of endogenous growth into the neoclassical growth model.

126 We keep time preference rate fixed for this Case as we are interested in analyzing the change in the patterns of welfare gains with a different value of substitution parameter ϵ

127 Hoxha et al. (2013) obtain this production function from Broda et al (2006) where it is used to highlight imperfect substitution of consumption goods to examine the impact of product variety in trade and growth.

128 The details of the derivations of the marginal product of capital or the return on the unit capital net of depreciation are provided in the Appendix 2.

produces a constant amount of each capital variety allowing capital used of each type to grow along with productivity and population over time. This production structure which allows each monopolistically competitive firm to act as an identical producer and produce an equal quantity of each capital variety allows us to consider the data of aggregate stock of capital and compute rates of returns with time-varying value of capital share in output. We, therefore, construct another *time series* of welfare gains and following Hoxha et al. (2013) assume the rate of return being equal to α/ϵ times $\frac{Y_t}{K_t}$ observed by the central planner to investigate how sensitive is the welfare measure to changes in the marginal product of capital calculated through this mechanism.

Finally, it is important to identify the value of ϵ to compute elasticity of output with respect to capital and rates of return. Hoxha et al. (2013) use simulations with five different values of ϵ ranging from 0.45 to 1. This study uses the value of 0.6 to measure welfare gains. The rationale of choosing this value is that it is neither close to 1 as in neoclassical model nor too small as in endogenous growth settings. Moreover, average annual capital share in output for most countries exceeds 30% but is less than 60%.[129] We are interested in investigating this issue because welfare gains which result from borrowing in international financial markets are affected with different values of ϵ, the coefficient of the CES production function for capital types.

The results in Appendix 13 show that welfare gains decrease marginally when we compute rates of return by using the argument of α/ϵ times $\frac{Y_t}{K_t}$ compared with the first three cases. One of the reasons for this decline is that when we use $\epsilon < 1$, it raises the output elasticity with respect to capital and makes the rates of return go up slightly rather than falling when only α is used. In the fourth case, out of the 22 countries, financial integration generates welfare gains which reflect an increase of more than two times in observed level of consumption relative to autarky in 7 countries at different points in time from 1961-2010 compared to 12 in the first, 14 in the second and 19 in the third case respectively. This is an interesting finding but requires caution and caveats for interpretation of welfare calculations which incorporates elements of endogenous growth model in the standard neo-classical settings.

129 Capital share for some countries like Bangladesh and Pakistan is not provided; we assume it on the basis of the fourth adjustment of the share of the agricultural sector considered by (Inklaar and Timmer, 2013). Only one country in MFIs group and five countries in LFIs group have capital share greater than 0.6 for a few years for the period 1961-2010.

[130] The results also suggest average annual welfare gains are lower than the welfare benchmark of two times increase in observed consumption relative to autarky in all countries of MFI group. This phenomenon is very interesting as the previous study by Hoxha et al. (2013) shows that welfare gains are higher when capital is not perfectly substitutable. In this welfare measure, five high welfare enhancing countries in terms of higher average annual observed level of consumption relative to autarky include Brazil, Columbia, Peru, Philippines and South Africa. [131] Table 13 compares the welfare gains of these countries in all four cases.

The results of Table 13 suggest that welfare gains for these 5 economies decline with the value of $\epsilon < 1$. Hoxha et al. (2013) measure welfare gains by using elasticity of output with respect to capital with two different values of α 0.3 and 0.4 respectively. An increase in α from 0.3 to 0.4 increases welfare gains by more than two times. These welfare gains are calculated at a point in time and disconnect the link between α and α/ϵ. As a point of comparison with this previous study, we show that, welfare gains actually decline when rates of return are calculated using the argument of α/ϵ times $\frac{Y_t}{K_t}$. We use these observed rates of return with country-specific values of α and depreciation rates to measure welfare gains. For example, average depreciation rate in Brazil and Peru is around 3% while in case of South Africa it is more than 4%. This depreciation rate is lower than 6% used in previous studies to measure welfare gains. A higher value of depreciation rate lowers the rate of return and increases welfare gains. Inklaar and Timmar (2013) explain that capital depreciates at a faster rate in developed countries compared to developing economies. As a result, the lower value of the deprecation rate increases the rate of return and decreases welfare gains. On the other hand, the average annual capital share in output for Brazil is 0.45, for Peru is 0.52, and for South Africa is 0.41. A higher value of α has a direct effect on the rate of return and reduces welfare gains. This results in reduction of observed level of consumption relative to autarky compared

130Caution is appropriate and important as calculation of rates of returns as per Hoxha et al. (2013) theoretical specification requires the use of $\frac{\alpha}{\epsilon}$while calculating the marginal product of capital. Though, they also mention that the rate of return of return depends on overall elasticity $\frac{\alpha}{\epsilon}$ but only employ α in calculating the marginal product of capital. Moreover, this is considered as an intermediate case it requires the production of each capital variety by a single monopolistically competitive producer using units of the final good such that total stock of capital is taken as the amount of foregone consumption. Finally, it also depends how sensitive the marginal product of any type of capital is to the overall size of the capital stock in the economy.

131Pakistan also falls in this category, but its labour share is assumed. Pakistan is the only country in this group of MFIs whose labour share are not provided in the PWT.8. This study used labour share for Pakistan in the light of its rural versus urban population. For example, in the early phase when more than 80% of Pakistan's population were rural, the labour share is considered 0.8 and capital share is considered 0.2. In later phases it was considered 0.7 and 0.65. These values are taken as one of the adjustments used in PWT 8 for estimating labour share is agriculture.

to the previous three cases. This point is noted in Hoxha et al. (2013) who suggest a slower reduction and convergence in the aggregate rates of return, but it is not considered in terms of marginal increase in the rates of return between capital varieties. In addition, elasticity of output with respect to capital increases both in Hoxha et al. (2013) as well as in the current research. While they explain that this rise in the elasticity of output with respect to capital leads to losses in consumption essential in autarky to approach the steady state, we think the rise in output elasticity may induce domestic households to invest more as they accumulate assets through more production.

Table 13: Comparison of average welfare gains in selected countries of MFIs in four cases

Country	Annual capital share α	Elasticity of output α/ϵ	Welfare gains (Case 1) $\epsilon = 1$	Welfare gains (Case 2) $\epsilon = 1$	Welfare gains (Case 3) $\epsilon = 1$	Welfare gains (Case 4) $\epsilon = 0.6$
Brazil	0.45	0.75	2.00	2.74	2.21	1.85
Columbia	0.49	0.81	1.93	2.06	2.00	1.76
Peru	0.52	0.86	2.01	2.22	2.15	1.85
Philippines	0.57	0.85	1.96	1.94	1.89	1.76
South Africa	0.41	0.68	2.05	2.05	2.03	1.85

Note α is average annual capital share in output.$\epsilon$is the substitution parameter. $\alpha/\epsilon$is the elasticity of output with respect to capital.

Thus, when the production structure is modified with $\epsilon < 1$, the rate of return on unit capital goes up and consumption under autarky increases. This can be interpreted as a relative fall in actual consumption.[132] On the other hand, it may also raise the world rate of return over time since changes in capital share of output occur in advanced countries. This is reflected in the large decline of labour share in certain countries of Western Europe and corresponding increase of capital share in the 1980s due to deregulation in goods and labour markets (Blanchard, 1997; Blanchard and Giavazzi, 2003). This indicates that the world rate of return may also change frequently as a result of changes in productivity growth, depreciation rate, and capital share in output. Following Inklaar and Timmer (2013), we consider these parameter values truly change over time. However, we consider that world rate of return remains lower than the domestic rate of return to allow a capital scarce developing country to keep borrowing from capital abundant advanced countries. This shrinks the gaps between the initial rate of return and world rate of return leading to reduced welfare gains. Welfare gains of all countries

132 Actual consumption, however, remains higher than consumption under autarky.

in MFIs are plotted in Appendix 18. The gains discussed in Case 4 are illustrated by the lines labelled as wg4.

The fourth case has important implications. It shows welfare gains cannot improve with elements of endogenous growth being incorporated in the neoclassical model unless the link between capital share and elasticity of capital with respect to output is broken. Hoxha et al. (2013) argue about the significance of this link and analyze welfare gains by disconnecting the former with the latter. They assume that marginal product of any single type of capital is less sensitive to overall capital stock in the economy. The recent rise in capital share of many economies due to fall in the price of capital goods show that marginal product of any single type of capital is perhaps not less sensitive to the total capital stock in the economy. Thus, if this link between capital share and capital elasticity continues to persist with substitution parameter < 1 , observed rate of returns increase leading to the fall of welfare gains. As a point of comparison of welfare gains measured in Case 4 with the previous three cases, we may conclude that neoclassical economic model which preserves this link and considers capital varieties as perfectly substitutable provides a more appropriate explanation for analysis of welfare gains of international financial integration in developing economies.

v. Overall Summary

The previous sections discuss and analyze four cases of time series of welfare gains from international financial integration in a group of emerging economies. The discussion of the results demonstrates that there are welfare gains from international capital flows reflected in higher observed level of consumption relative to autarky. In addition, these gains are different for each country since each economy undergoes different patterns of structural changes and productivity growth over time. This emphasizes the specification of *country-specific* parameters based on *country-specific* economic conditions and environment. We, therefore, construct *time series* of welfare gains to obtain more insights about welfare perspective across countries and over time. Table 14 shows the benefits of international capital flows for the overall sample of MFIs in four different cases.

Table 14: Welfare gains for MFIs

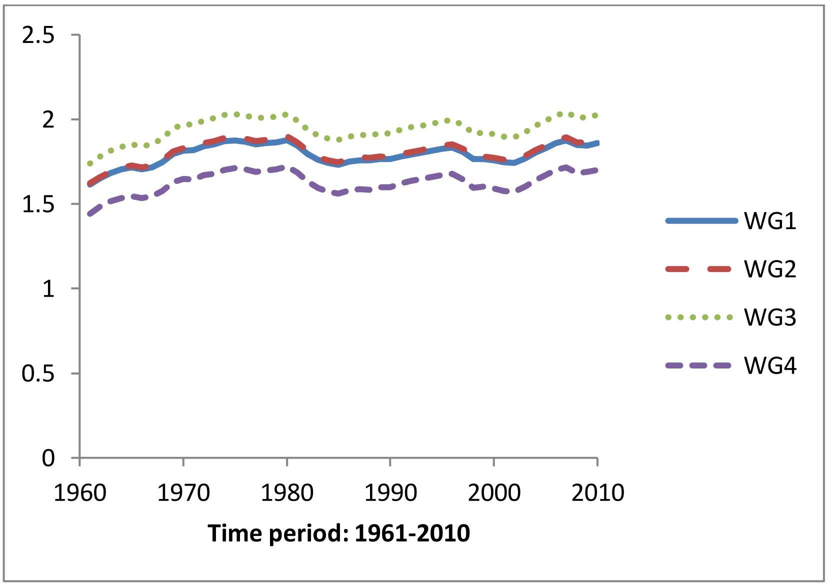
Country groups	Series	Mean	Maximum	Minimum	Std. Dev.	Observations
Overall MFIs	WG1	1.79	2.06	1.48	0.17	22
	WG2	1.81	2.75	0.97	0.33	22
	WG3	1.94	2.27	1.24	0.26	22
	WG4	1.62	1.97	1.22	0.19	22

Note: WG1= welfare gains with fixed beta, WG2= welfare gains with time discount factor derived from real interest rate, WG3= welfare gains derived from estimated time preference rate, WG4: welfare gains when capital varieties are imperfect substitutes. Source: Authors calculations.

Our welfare calculations show that welfare gains are the highest for the third case when we use estimated value of the time preference rate (β) for each county along with country-specific values of remaining parameters. Though we specify country-specific values for all other parameters in other cases of welfare calculations, we use the fix value of time preference rate (β) in Case 1 and Case 4 for all countries. In Case 2, we use the value of time preference rate in terms of discount rate derived from real interest data. We find lower level of welfare gains in the first and fourth cases compared to third case of welfare calculations. Welfare gains for the second case are also higher compared to cases with fixed values of time preference rate (β) for all countries. In Case 4, welfare gains are the lowest due to the assumption of substitution parameter of $\alpha < \epsilon \leq 1$.

It is also interesting to note that we observe more or less similar trend in all four cases of welfare gains but the size of welfare effects varies over time, perhaps because of the country-specific value of the patience parameter. It underscores the need to take into account a country's respective consumption behaviour to explain patterns of welfare gains. In addition, observed level of consumption relative to autarky indicates that there are welfare changes across economies over time. Figure 13 shows average annual welfare gains for all MFIs. [133]

Figure 13: Welfare gains for MFIs



Notes: This figure shows four alternative cases of welfare gains represented by WG1, WG2, WG3 and WG4 for the MFIs. WG1=Time-varying welfare gains given time preference rate (β). WG2 = Time-varying welfare gains with time preference rate based on real interest rates. WG3 = Time-varying welfare gains with estimated time preference rate (β). WG3 = Time-varying welfare gains with capital varieties as imperfect substitutes.

133 Average annual welfare gains for the group of countries are represented as WG.

In the current study, following Hoxha et al. (2008), we assume that differential in the rates of return persist across countries and over time. As a result, no country is perfectly financially autarkic in the year 1961 nor perfectly financially integrated in the year 2010. This intermediate setting allows for the construction of time series of welfare gains for the period 1961-2010 since differences in the rates of return for long period of time encourage international capital flows to continually move to most developing and emerging economies. In other words, it implies that developing countries which receive international capital flows continue to benefit from the resultant increase in consumption throughout the period 1961-2010.[134]

4.5.2 Trends of welfare gains in LFIs

We explain the results of four cases of welfare gains for LFIs which constitute a group of 29 economies in our sample. Similar to the analysis for MFIs countries, we follow the specification of parameters in four different cases for measuring welfare gains of international financial integration. We report the results for four cases in appendices 14-17. These cases are discussed in detail in the methodology as well as in previous sections. In sub-sections (i)-(iv), we analyze the welfare gains of all four cases for the second group of countries to provide an in-depth perspective and develop comparisons with the previous literature. Subsection (v) provides an overview of the summary of four cases.

i. Case 1: Computation of time-varying welfare gains with given time preference rate (β)

We present the results of the first case of LFI countries in Appendix 14. The results indicate that welfare benefits of international financial integration expressed in terms of observed level of consumption exceed by more than two times relative to autarky in 17 countries out of the total of 29 economies in different years between1961-2010.[135] Out of 17 countries, 3 countries namely Burundi, Niger and Togo experience more than two times average annual observed level of consumption relative to autarkyover the period 1961-2010. Similar to the analysis of MFI countries, we set the benchmark of 2 for the welfare ratio to compare the observed level of consumption relative to autarky. [136]

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134 As mentioned in the stylized facts international capital flows has many forms which include debt flows, FDI and equity flows. Though countries liberalized in many phases and in different time periods, most of them have been receiving some form of capital flows from advanced countries during the entire period of the analysis 1961-2010.

135 We will provide more details about the periodic patterns of welfare gains in LFI economies when we discuss regional welfare outlook in later sections.

136 As mentioned in the discussion on MFIs, our welfare benchmark of gains from international capital flows is different from the previous studies of integration literature. GJ calculate welfare gains at a point in time for the year 1995. They set the benchmark of 2% of annual consumption which occur when capital output ratio for a country is less than 1.29 or greater than 4.38. This welfare benchmark estimate is determined by analyzing welfare

Among the three countries, for which financial integration brings welfare benefits of observed level of consumption exceeding more than two times relative to annual autarky consumption, Niger has an annual average capital output ratio of 4.48 while average capital output ratio for Burundi and Togo is 1.82 and 2.69 respectively. The capital output ratio of Burundi lies between 0.40 to 4.20 for the period 1961-2010. For Niger, capital output ratio lies within the range of 2.56 to 8.95. The capital output ratio for Togo lies between 0.71 to 7.25. The wide variation in the capital output ratios illustrate two things. These countries are very capital scarce economies as compared to the countries within the MFI group. The lower end of capital output ratio in most of these economies occurs in periods when the economy undergoes severe crisis. For example, in Burundi capital output ratio falls to a lower level of 0.40 in 1971 when the country suffers from civil war leading a massive fall in growth rate from 23% to just 3%. [137] Secondly, as these economies are very capital scarce, rise in investment rates in some time periods of time markedly increase the capital output ratios leading to higher welfare gains. In case of Burundi, investment rises for the first half of the analysis 1961-1988 while it fluctuates widely in the second half during 1988-2010. Some of the earlier studies have reported higher capital output ratios closer to the range observed in these economies (Inklaar and Timmer, 2013). In Case 1, Togo persistently experiences welfare gains in terms of observed level of consumption which exceeds by more than two times relative to autarky for the entire period 1961-2010. This may result from the higher level of capital scarcity in this LFI economy. Coeurdacier et al. (2013) observe that in the neoclassical model countries with very higher degree of capital scarcity experience higher welfare gains.

Finally, it is important to mention about the patterns of welfare gains in another LFI African economy Mauritius. As mentioned in the stylized facts, the ratio of gross stock of foreign assets and liabilities to GDP increases manifold in the last decade. We observe that the ratio of welfare gains which remains steady during the last two decades is higher relative to earlier years in Mauritius. Overall this welfare ratio is less than 2 relative to these three countries which attract lower amount of foreign capital. Implied capital share in income in Mauritius increases by more

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gains as a function of the initial capital output ratio. In the current study, we are interested in constructing the time series of welfare gains. The ratio of welfare gains reflects a welfare level in terms of actual consumption relative to autarky for each year. Following GJ, we assume that actual consumption under integration must be higher than autarky level of consumption for realizing positive welfare gains. We, therefore, set the benchmark value of this ratio equal to 2 which implies a two times increase in observed or actual level of consumption relative to autarky. We then compare it with the capital output ratio of the given year. As we are using actual data to derive consumption under autarky, welfare gains in terms of percent change fluctuate widely as compared to previous studies. However, we are only focussing on welfare levels as we want to use the time series of welfare gains to investigate the short run and long run relationship of welfare gains with trade channels.

137 This is based on the calculations of the data of PWT 8.

than 12% during this period, however, these capital flows did not result in higher economic growth. GDP growth rate in Mauritius fell from average of 5% from 1990-2000 to 4.4% in 2000-2010.[138] One possible reason for the rise in the ratio of gross stock of foreign assets and liabilities to GDP during the last decade is the increase in the number of millionaires in this Island nation.[139]The new wealthy class may have accumulated capital in terms of investments and their return both within the economy and abroad. Secondly, Mauritius is also regarded as one of the easiest places in terms of doing business in Africa (International Finance Corporation, 2012). We plot the welfare gains of all countries included in the LFI group in Appendix 19. The welfare gains for Case 1 are illustrated by the small dashed line labelled as wg1.

ii. Case 2: Computation of time-varying welfare gains with time preference rate (β) based on real interest rates

We report welfare gains of international financial integration for Case 2 in Appendix 15. In the second case, we include the country-specific time discount factor β in welfare calculations. Out of a sample of 29 countries, international financial integration generates welfare gains in terms of observed level of consumption which exceeds by more than two times relative to autarky in 19 LFI economies in different years between 1961-2010. Observed level of consumption in 2 countries namely Togo and Paraguay exceeds by more than three times relative to autarky consumption in different years between 1961-2010. Out of the 19 countries, average annual observed level of consumption in 8 countries is higher by more than two times relative to autarky. These countries include Burundi, Cameroon, Ecuador, Honduras, Jamaica, Kenya, Paraguay and Togo.

These results show that welfare gains change with the use of country-specific time discount factor β. Togo's time discount factor β calculated from real interest rate data is 0.91 which shows that people are more impatient as compared to fixed value of 0.96 in the first case. Similarly, the time discount factor β calculated for the economy of Paraguay is 0.86. Similar to case 1, Togo is one Western African LFI nation in which observed level of consumption remains higher by more than two times relative to autarky consumption for the entire period 1961-2010 in Case 2. One main reason for the relatively higher observed level of consumption in Togo is the rise in investment patterns for the first 20 years of the period 1961-1980. This

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138 These figures are calculated from data obtained from PWT 8. As Mauritius remains a British Colony before 1968, it is difficult to make welfare comparison within this economy overtime.

139 The number of millionaires in Mauritius having US dollars grows by 340% since 2000. It experiences increase in this number even during the financial crisis. We obtain this information from the New Word Wealth Investment Review available at https://www.cnbcafrica.com/files/MauritiusResearchBrochure.pdf

coupled with the completion of various reform measures with the support of IMF and World Bank in the second half of the analysis contributes in relative higher economic growth in the economy. As a result of the successful completion of the IMF extended facility this country became eligible for the Heavily Indebted Poor Country (HIPC) debt relief completion point which provides Togo debt relief of more than 95% in the year 2010.[140] This program which provides space for more capital accumulation may have contributed in the growth of welfare gains in terms of higher increase in observed level of consumption relative to autarky over the last two decades 1990-2010. For the rest of the 7 economies which experience average annual welfare gains of observed level of consumption by more than two times relative to average autarky consumption, the time discount factor β for 6 countries is lower than the benchmark of 0.96. This implies that people in these economies get more impatient and tend to consume more today instead of tomorrow and enjoy the benefits of higher consumption in terms of welfare gains. We plot the welfare gains of all countries included in the LFI group in appendix 19. The welfare gains for Case 2 are illustrated by the dots labelled as wg2.

iii. Case 3: Computation of time-varying welfare gains with estimated time preference rate ($\boldsymbol{\beta}$)

The results of the welfare gains for the third case are reported in Appendix 16. In the third case, we compute consumption under autarky by using the estimated value of time preference rate β for each country and employ remaining parameters specific to each economy as in the first two cases and subsequently measure welfare gains. In this specific case, welfare gains grow by a big margin at different points in time in many LFI economies for the period 1961-2010. The times series patterns of welfare gains show that out of a sample of 29 economies, observed level of consumption exceeds by more than two times relative to autarky in 25 economies in different years between1961-2010. Welfare gains reflecting the observed level of consumption reach the highest level of more than six times relative to autarky in a western African economy of Burkina Faso at different points in time for the period 1961-2010 when we employ the estimated value of time preference rate β. In addition, 3 economies namely Burundi, Dominic Republic and Togo experience observed level of consumption exceeding by more than four times relative to autarky in different years between 1961-2010. These trends highlight the significance of welfare gains within countries over time due to structural transformation,

140 The patterns of investment are documented from the PWT 8 while information about the IMF program and debt relief is obtained from The World Factbookhttps://www.cia.gov/library/publications/the-world-factbook/geos/to.html

productivity growth and financial openness. International financial integration produces two times more average annual observed level of consumption relative to autarky in 17 LFI economies out of a sample of 29 economies for the period 1961-2010. Moreover, five economies enjoy benefits of more than three times observed level of consumption relative to autarky during the same period.

These results highlight the significance of country-specific patience parameter in determining the welfare gains across countries. We observe some interesting phenomena of welfare gains of international financial integration in Case 3 of LFI economies. Welfare gains are higher in terms of increase in observed consumption relative to autarky in countries with lower value of the time preference rate β. Beckar and Mulligan (1997) explain this link of time preference rate in the light age consumption profiles of the people. They contend that the slope of the age consumption profile increases as a result of the lower value of the time preference rate which contributes in higher economic growth. Secondly these economies are characterized by lower per capita consumption and consumption effect appears to be sensitive in response changes to income and growth. For example, the estimated value of the time preference rate β of an African country Burkina Faso is 0.28 which is extremely lower than the standard benchmark of 0.96. During the last 20 years of the analysis of welfare gains 1991-2010, this economy experiences higher growth rate coupled with higher consumption growth. One possible reason for this lower value of the time preference is that people are extremely impatient and tend to consume more in response to changes in income and growth. A more recent study by Wang et al (2016) observes country level variation in time preferences in terms of waiting tendency of the people. They find higher degree of variation across countries from 8% in Nigeria to 89% in Germany. A lower value of time preference parameter β in this context implies that people strongly prefer to consume at present instead of the future in low income countries. These results may be interpreted with caution as there exists a possibility of certain micro level indicators that are relevant in the estimation of the consumption models. Gourinchas and Parker (2002) highlight the significance of consumer expenditure surveys in estimating the model of optimal life cycle consumption to better describe household consumption behaviour. In current study, however, we are only interested in estimating value of time preference rate β and use it for measuring welfare gains. We plot the welfare gains of all countries included in the LFI group in Appendix 19. The welfare gains for Case 3 are illustrated by the big dashed line labelled as wg3.

iv. Case 4: Computation of time-varying welfare gains with capital varieties as imperfect substitutes

The results of the welfare gains of international financial integration in LFI group for Case 4 are reported in Appendix 17. In the fourth and final case, following Hoxha et al. (2013), we measure welfare gains of international capital flows by introducing substitution parameter ϵ in the welfare calculations. Similar to the analysis of the MFI economies, we attempt to measure welfare gains with the value of $\epsilon < 1$. This assumption allows capital varieties to become imperfect substitutes in sharp contrast to the neoclassical economic model which considers that capital is perfectly substitutable. In the first three cases, following GJ, we consider that capital is perfectly substitutable.

The results in the Appendix 17 indicate that there is a marginal reduction in the size of the welfare gains measured by using the argument of the rate of return as $\frac{\alpha}{\epsilon}$ times $\frac{Y_t}{K_t}$ instead of α times $\frac{Y_t}{K_t}$. The rate of return calculated in this manner is higher than the previous three cases as the use of $\epsilon < 1$increases elasticity of output with respect to capital. This increase in the rate of return increases consumption under autarky resulting in a decline in the ratio of actual consumption relative to autarky.[141] Following Inklaar and Timmer (2013), we consider parameter values which are used to compute rates of return change over time. However, we consider that the world rate of return remains lower than the domestic rate of return to allow a capital scarce developing country to keep borrowing from capital abundant advanced countries. This shrinks the gaps between the initial rate of return and world rate of return leading to reduced welfare gains. It is important to emphasize that this reduction occurs in situations where the marginal product of any single type of capital is not completely insensitive to the overall stock of capital in the economy. It is particularly relevant for economies which are more capital scarce and where market is characterized by imperfect competition.

The results of the Appendix 17 also show that financial integration produces welfare gains in terms of observed level of consumption exceeding by more than two times relative to autarky in 12 economies out of a sample of 29 at different points in time for the period 1961-2010. No country in the sample except Togo experiences observed level of consumption in excess of three times relative to autarky with $\epsilon < 1$. Moreover, the number of countries for which observed level of consumption exceeds by more than times relative to autarky in different phases of the period 1961-2010 is lower as compared to 17 countries in the first case,

141Actual consumption, however, remains higher than consumption under autarky.

19 in the second case and 25 in the third case respectively. Togo is the only country which enjoys welfare benefits of annual average observed level of consumption in excess of times relative to autarky. Similar to MFI group, in this welfare case, we select five high welfare enhancing countries in terms of higher average annual observed level of consumption relative to autarky in order to draw comparisons within these countries in all four cases. Table 14 presents the welfare gains of these selected LFI economies.

The results of table 15 show that welfare gains in these economies decline with the value of $\epsilon < 1$. Hoxha et al. (2013) measure welfare gains by using elasticity of output with respect to capital with two different values of α 0.3 and 0.4. An increase in α from 0.3 to 0.4 increases welfare gains by more than two times. These welfare gains are calculated at a point in time and disconnect the link between α and α/ϵ. As a point of comparison with this previous study, we show that, welfare gains actually decline when rates of return are calculated using the argument of α/ϵ times $\frac{Y_t}{K_t}$. We use these observed rates of return with country-specific values of α and depreciation rates of capital δ to measure welfare gains. For example, average depreciation rate is 3%. This depreciation rate is lower than 6% used in previous studies to measure welfare gains. It is also emphasized that capital depreciates at a faster rate in developed countries as compared to developing economies (Inklaar and Timmer, 2013). As a result, the lower value of the depreciation rate increases the rate of return and decreases welfare gains. On the other hand, the average annual capital share in output for Niger is 0.43. A higher value of α has a direct effect on the rate of return and reduces welfare gains expressed as ratio of actual consumption to autarky paths of consumption using equation (3.5). Welfare gains of all countries in LFIs are plotted in Appendix 19. The gains discussed in Case 4 are illustrated by the lines labelled as wg4.

Table 15: Comparison of average welfare gains in selected countries of LFIs in four cases

Country	**Annual Capital share α**	**Elasticity of output α/ϵ**	**Welfare gains (Case 1) $\epsilon = 1$**	**Welfare gains (Case 2) $\epsilon = 1$**	**Welfare gains (Case 3) $\epsilon = 1$**	**Welfare gains (Case 4) $\epsilon = 0.6$**
Burundi	0.25	0.41	2.11	2.11	3.43	1.92
Honduras	0.41	0.68	1.98	2.08	3.01	1.78
Jamaica	0.44	0.73	1.97	2.01	2.33	1.78
Kenya	0.28	0.46	1.96	2.00	2.54	1.80
Niger	0.43	0.71	2.11	2.22	2.50	1.98
Togo	0.14	0.23	2.31	2.44	3.37	2.22

Note: α is average annual capital share in output.$\epsilon$is the substitution parameter. $\alpha/\epsilon$is the elasticity of output with respect to capital.

As mentioned before, the fourth case has important implications for welfare gains. While welfare gains of international financial integration increase in the first three cases, they decline marginally in the fourth case. It shows welfare gains decrease with elements of endogenous growth being incorporated in the neoclassical model unless the link between capital share and elasticity of capital with respect to output is considered broken. Hoxha et al. (2013) argue about the significance of this link and analyze welfare gains by disconnecting the former with the latter. However, if this link is not considered broken, as in the current study, observed rates of returns for economies increase which result in the fall of observed level of consumption relative to autarky. This occurs in situation where the marginal product of any single capital variety also affects the overall capital stock in the economy. As capital flows from capital abundant developed countries to capital scarce developing economies, we may consider these flows occurs in specific sectors, where the marginal product of any single type of capital is not completely insensitive to overall stock of capital in the economy. This is one area which may perhaps require further research. Compared with the previous three cases, we may conclude that neoclassical economic model provides a more appropriate explanation for the analysis of the welfare gains of international financial integration.

v. Overall Summary

We explain and examine the time series patterns of welfare gains of international financial integration in LFI economies for four different cases in subsections (i)-(iv). The results illustrate the dynamic and heterogeneous nature of welfare gains across countries and over time. We find that these welfare gains from international capital flows for each country vary due to its structural transformation over time. Table 16 shows the benefits of international capital flows for the overall sample of LFIs in four different cases. It shows that LFI countries' experience highest welfare gains in Case 3 when we use the estimated value of the time preference rate (β).

Table 16: Welfare gains in LFIs

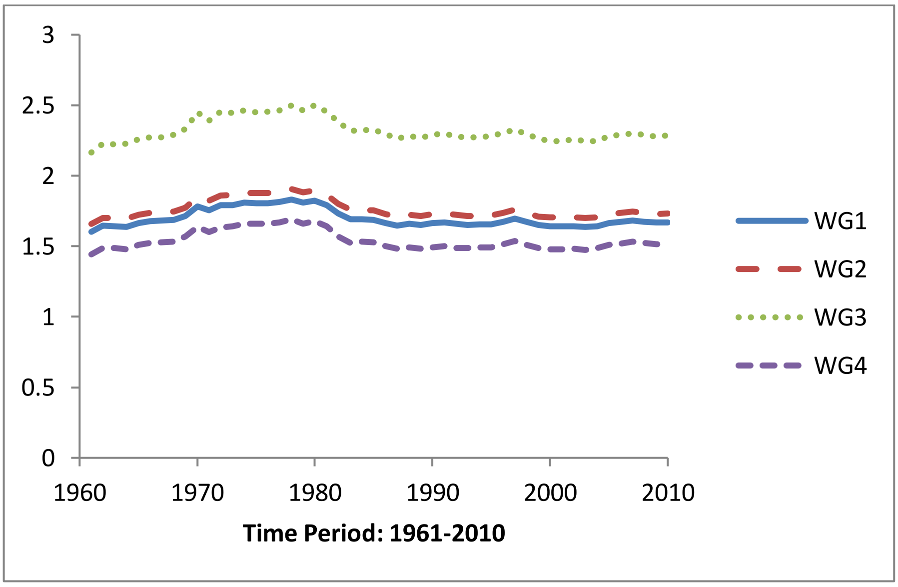
Country groups	Series	Mean	Maximum	Minimum	Std. Dev.	Observations
Overall LFIs	WG1	1.70	2.32	0.81	0.38	29
	WG2	1.76	2.45	0.76	0.44	29
	WG3	2.32	6.24	0.97	0.99	29
	WG4	1.54	2.23	0.69	0.35	29

Source: Authors calculations. Note: WG1= welfare gains with fixed beta, WG2= welfare gains with time discount factor derived from real interest rate, WG3= welfare gains derived from estimated time preference rate, WG4: welfare gains when capital varieties are imperfect substitutes.

As mentioned earlier, we specify country-specific values for all parameters in other cases of welfare calculations, but we use the fix value of time preference rate (β) in Case 1 and Case 4 for all countries. The use of constant time preference rate (β) for all countries results in lower level of welfare gains in the first and fourth cases as compared to third case of welfare calculations. In Case 2, we compute consumption under autarky from the country-specific value of time preference rate (β) in terms of discount factor derived from real interest data and express welfare gains as a ratio of actual consumption relative to autarky consumption. Welfare gains for the second case are also higher as compared to cases with fixed values of time preference rate (β) for all countries. In Case 4, welfare gains are the lowest due to the assumption of substitution parameter of $\alpha < \epsilon \leq 1$.

Figure 14 explains the patterns of average annual welfare gains for LFIs between1961-2010. This figure highlights some interesting features. While we observe more or less similar trend in all four cases of welfare gains similar to MFIs, the size of welfare effects vary widely over time compared to MFI economies. We also notice a greater degree of differences in the value of estimated patience parameter in LFIs compared to MFIs (Appendices 4A and 4B). This difference in patience level of economies produces a different consumption effect that perhaps explains differences in consumption behaviour of countries living under integration relative to autarky.

Figure 14: Welfare gains for LFIs



Notes: This figure shows four alternative cases of welfare gains represented by WG1, WG2, WG3 and WG4 for the LFIs. WG1=Time-varying welfare gains given time preference rate (β). WG2 = Time-varying welfare gains with time preference rate based on real interest rates. WG3 = Time-varying welfare gains with estimated time preference rate (β). WG3 = Time-varying welfare gains with capital varieties as imperfect substitutes.

Compared with the welfare gains for MFI countries, welfare gains for the first two cases in LFI economies provide a different outlook. This perhaps results from the difference in the values of preference parameter specific to each economy in LFI group as compared to the MFI economies. The results in the Appendix 3 show that the value of this parameter in terms of discount factor is different than the benchmark value of 0.96 for most LFI countries as compared to the MFI economies. That is why welfare gains for the first two cases in MFIs are mirror image of each other while providing a different outlook for LFI economies. As a second point of comparison, our baselines calculations WG1 are also different for the third case as well. This difference is larger in magnitude for LFIs as compared to MFIs which perhaps point to the even wider degree of difference in the value of patience parameter specific to each country in the former group than the latter. Finally, the results of Case 4 show that welfare gains WG4 decline marginally as compared to the baselines calculations WG1 if capital varieties are not infinitely substitutable and remain sensitive to the stock of capital.

As mentioned in the theoretical framework, the current study, constructs time series of welfare gains expressed as a ratio of actual consumption relative to autarky. Welfare gains result from the differential in the rates of return across countries and over time. In all four cases, we consider flows of capital over time allow this differential to remain for a long period as countries undergo varying degrees of financial integration. This is the one of the essential ideas of the current study for constructing time series of welfare gains. It is also perhaps more realistic to consider that no country is perfectly closed to capital flows in 1961 nor fully financially integrated in the year 2010. This relative intermediate setting is important in order to construct time series of welfare gains for the period 1961-2010 as continuing flows of capital over time to developing countries allow differential in rates of return to persist for longer durations. Put differently, it implies that developing countries continue to receive foreign capital which produces consumption effects of varying magnitude throughout the period 1961-2010.[142]

Overall our results indicate that welfare gains are different across countries and over time. The results also emphasize the significance of *country-specific* parameter values in measuring welfare gains. Consumption patterns and patience levels of people in emerging economies are better explained with the estimated value of country-specific time preference rate compared to constant value which implies that people are equally patient across countries. Productivity growth differs across countries which have been well documented in the growth

142 As mentioned in the stylized facts international capital flows has many forms which include debt flows, FDI and equity flows. Though countries liberalized in many phases and in different time periods, most of them have been receiving some form of capital flows from advanced countries during the entire period of the analysis 1961-2010. Hoxha et al. (2008) also provide the theoretical justification for this continued inflow of foreign capital in the neoclassical economic model which exists in the differentials of rates of returns over time between the domestic rate of return and world rate of return.

literature (Inklaar and Timmer, 2013). Depreciation rate also varies between capital scarce and capital abundant countries over time. Finally, it is important to incorporate *country-specific* values of parameters since countries undergo structural changes over time. Given this background, we may conclude that there exist elements of *country specificity* which contribute to welfare gains of international financial integration in emerging and developing economies.

CHAPTER 5
COUNTRY EXPERIENCES OF WELFARE GAINS

5.1 Introduction

In the previous chapter we describe the trends of specified parameters to compute welfare gains of international capital flows and provide a discussion of four alternative measures of welfare gains for a sample of MFI and LFI economies. This chapter presents a more detailed analysis of the welfare experiences of selective economies with international financial integration. For this purpose, we look at the patterns of welfare gains of broad range of economies from various regional groups within Asia, Africa and Latin America. This allows us to draw more on country-specific experiences to develop better understanding and seek more insights regarding the welfare effects of international capital mobility. It is important to discuss time-varying welfare effects within economies because we are also interested in analyzing country level features which cause fluctuations inwelfare gains over the years. Therefore, we relate our results with country basedfeatures which may also drive welfare responses of international financial integration.

We choose a total of 11 economies 5 from Asia and 3 each from Africa and Latin America. In Asia, we primarily focus on five MFI countries because more than half of the economies from this group belong to this region. These five economies include China, India, Israel, Indonesia and Korea. Section 5.2 looks at the welfare implications of international financial integration in selective Asian economies. In Africa, we discuss the time series of welfare gains for one MFI economy and 2 LFI economies namely South Africa, Niger and Burkina Faso. Section 5.3 shows the effects of international capital flows on welfare gains in these economies. Finally, in the third group of Latin America, we describe time-varying welfare gains for 2 MFI economies and one LFI country which include Brazil, Mexico and Paraguay. Section 5.4 throws light on the potential welfare gains of international financial integration in these economies. We also present the overall summary of the discussion for each regional group of countries at the end of each of section.[143]

We select countries within each group on the basis of their documented experiences with international capital flows to develop comparisons with earlier literature. In addition, these MFI and LFI economies experience welfare gains exceeding the benchmark level oftwo times

143 The computation process of measuring country-specific welfare gains accounts for sources of welfare gains in the light of theoretical framework. In the empirical part, our focus is to test the short run and long run relationship of trade variables of exports and imports with welfare gains. Establishing additional sources of welfare gains in an econometric model can be an interesting area of future research.

increase in observed level of consumption relative to autarky. [144] Finally, we cover these 11 countries for a more detailed and comprehensive analysis because most of these individual economies also faced financial and currency crises which hit Asia and Latin America during the last three decades.

5.2 Selected country experiences from Asia

Out of a group of 22 MFI economies, 12 economies belong to Asia.[145] Asia is an interesting case because it receives the bulk of North South capital flows in the formof foreign direct investment. The stylized facts mentioned in introduction show that 4 out of the top 5 MFI economies receiving FDI inflows as percentage of GDP over the period 1980-2010 belong to Asia. These four economies include Hong Kong, Singapore, Malaysia and China. Hong Kong ranks first since its ratio of FDI to GDP exceeds 20% followed by Singapore with12%. Malaysia and China with FDI to GDP ratio of more than 3 rank fourth and fifth respectively.[146] While Hong Kong and Singapore are considered relatively more financially open economies from a long time, we are interested in China because it is regarded as the largest transition and developing economy (Rodrik, 2003).

In addition, the stylized facts indicate that out of the top 5MFI economies in terms of *de facto* and *de jure* measure of financial integration, 4 economies come from Asia. Economies which rank higher on account of *de facto* measure based on actual capital flows measured as the ratio of gross stock of foreign assets and liabilities include Hong Kong, Singapore, Malaysia

144 As it is not possible to discuss each MFI and LFI economy meeting this benchmark as a separate country case, we set these benchmark conditions for choosing diverse countries. Secondly most LFI economies are small economies experiencing welfare gains in terms of observed consumption which exceeds by more than two times relative to autarky consumption. The objective of this discussion is to highlight the role of country-specific conditions as countries undergo structural transformation which results in changes in parameters specified for measuring welfare gains overtime. As mentioned in the previous chapter, our welfare benchmark of gains is different from the previous studies of integration literature. GJ calculate welfare gains at a point in time for the year 1995. They set the benchmark of 2% of annual consumption which occur when capital output ratio for a country is less than 1.29 or greater than 4.38. This welfare benchmark estimate is determined by analyzing welfare gains as a function of the initial capital output ratio. In the current study, we construct time series of welfare gains. The ratio of welfare gains reflects a welfare level in terms of actual consumption relative to autarky for each year. Following GJ, we assume that actual consumption under integration must be higher than autarky level of consumption for realizing positive welfare gains. In the current study, observed level of consumption remains higher than the derived autarky consumption. We, however, focus on welfare patterns reflecting an observed level of consumption which exceeds by more than two times relative to autarky. We consider it a realistic benchmark as we are measuring welfare gains of international capital flows and associated impact caused by these flows which are captured in productivity changes, increasing capital share and differences in depreciation rates. We use time series of these parameters in welfare calculations. GJ mention that welfare benefits may go up by more than 50 times than the benchmark neoclassical level of 2% of annual consumption if developing economies are able to reap the benefits of higher productivity and better allocation of resources due to financial integration. This benchmark is equivalent to a welfare ratio of 2 in the current study which implies a two times increase in the observed or actual level of consumption relative to autarky.

145 We also consider Turkey part of Asia because it is the only country geographically located in two continents Asia and Europe in our sample.

146 Chile with a ratio of 4.4 ranks third in terms of receiving FDI inflows as percentage of GDP.

and Israel. Four economies which rank high in MFI group based on Chinn-Ito index of financial openness (a *de jure measure*) include Hong Kong, Singapore, Indonesia and Malaysia. It is interesting to note that countries such as India and Korea are not highly ranked in terms of these measures of international financial integration, however, their growth and welfare experiences merit attention because of economic transformation which occurs in these economies over the last five decades. [147]

On the other hand, only three Asian countries fall in the category of LFI group which includes Bangladesh, Sri Lanka and Syria. These three LFI economies do not receive worthwhile capital flows as compared to MFI economies. [148] As the bulk of Asian economies included in our sample fall in the MFI group, we will primarily focus more on the patterns of welfare gains in these economies. Table 17 illustrate the four cases of welfare gains for the two specified groups in Asia.

Our results indicate that average annual observed level of consumption in MFI economies of Asia relative to autarky is higher for the third case WG3 as compared to other cases. In this specific case, maximum value of observed level of consumption exceeds by more than two times relative to autarky in MFI Asian countries. GJ report welfare gains of 1.24% of annual consumption for a group of 82 non-OECD economies. For the Asian countries, they report welfare gains equivalent to 1.27% of annual consumption for a sample of 16 economies. GJ also explain that the associated impact of capital flows which account for productivity changes would be fifty times higher than the neoclassical welfare benchmark of 1.27% in Asia. As a point of comparison with the previous study, the results of Table 17 show that observed level of consumption exceeds this benchmark in three out of the four cases. In the fourth case WG4, welfare gains are marginally lower than this benchmark. However, in LFI economies welfare gains are lower than this benchmark welfare number. As mentioned before, this group is not only small in Asia but also received less international capital flows from advanced countries.

147 Rodrik (2003) also explain in detail the economic transformation which occurs in economies of India and Korea.
148 FDI inflows as percentage of GDP measured in the current study are less than 1% for Bangladesh and Syria and equal to 1% for Sri Lanka. Bangladesh also lies at the bottom of LFI ranking for de facto measure of financial openness.

Table 17: Welfare gains in MFI and LFI countries of Asia

Country Groups	No of Series	Mean	Maximum	Minimum	Std. Dev.	Observations
MFIs in Asia	WG1	1.72	1.97	1.48	0.15	12
	WG2	1.66	1.95	0.97	0.26	12
	WG3	1.86	2.27	1.24	0.25	12
	WG4	1.57	1.97	1.23	0.18	12
LFIs in Asia	WG1	1.24	1.75	0.95	0.44	3
	WG2	1.23	1.75	0.96	0.45	3
	WG3	1.26	1.78	0.97	0.45	3
	WG4	1.16	1.66	0.88	0.43	3

Note: WG1=Time-varying welfare gains given time preference rate (β). WG2 = Time-varying welfare gains with time preference rate (β) based on real interest rates. WG3 = Time-varying welfare gains with estimated time preference rate (β). WG3 = Time-varying welfare gains with capital varieties as imperfect substitutes. Observations indicate number of countries included in the sample. Appendix 1 provides the list of the Asian MFI and LFI countries.

To begin with the analysis of country experiences, GJ again provide immediate motivational relevance for the discussion of results. They report a welfare number for the full sample as a benchmark estimate and discuss the welfare gains for this sample with China and India and by excluding them as well. In China, for the year 1995, welfare gains are equivalent to 1.79% of annual consumption and in India this number is 1.08% of annual consumption. The welfare estimate in GJ study falls from 1.24% of annual consumption to 1.06% of annual consumption when China and India are excluded from the calibration analysis. While they implicitly highlight the significance of welfare gains for certain specific economies namely China and India at a point in time, we are interested in the explicit analysis of the patterns of welfare gains over time. Therefore, we will start our analysis with these two economies. The following sub-sections explain experiences of five Asian countries with welfare gains from international financial integration.

i. China

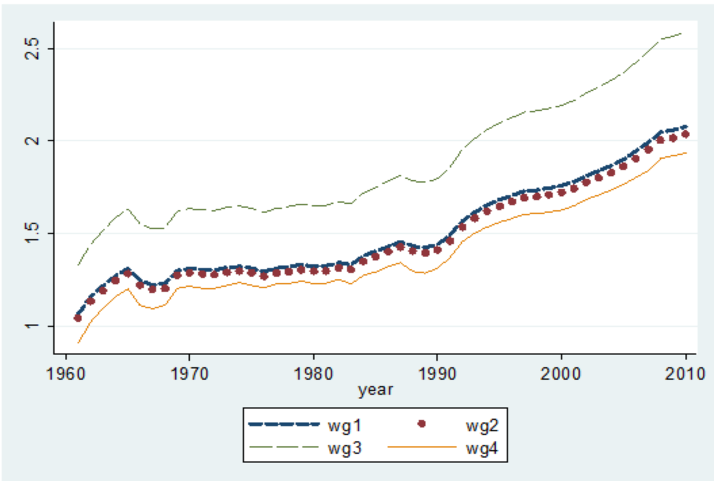
The process of economic liberalization in China started in the 1980s with the series of economic reforms in various sectors of the economy. These reforms were introduced in phases and range from issuance of corporate bonds by business enterprises to restructuring and regulation of the financial sector. China lifted restrictions on repatriation of profits and dividends by foreign investors to implement full current account convertibility in 1996.[149] In 1992, China's State Council set up China Securities Regulatory Commission which started the process of capital

149 Ariff and Khalid (2005) document all details on the liberalization policies and financial sector reforms implemented in China during 1980-2002.

markets development and regulation (Reynolds, 2016). It is important to focus on the patterns of welfare gains of international financial integration in China since it is one of the largest recipients of FDI inflows as percentage of GDP. As mentioned earlier in the stylized facts, China is ranked fifth in the MFI economies on the basis of overall average of FDI inflows as percentage of GDP for the period 1980-2010.

Figure 15 shows the patterns of four cases of welfare gains in China. It illustrates that welfare gains of international financial integration for the third case are higher than remaining three cases.[150] In Case 3, we use estimated value of the patience parameter and remaining parameters specific to Chinese economy to measure time-varying welfare gains between 1961-2010. China's time preference rate obtained by estimating equation (3.19) is 0.77 which is different from the benchmark value of 0.96. As a result, Chinese average annual observed level of consumption increases relative to autarky. Its ratio of welfare gains rises from 1.5 from our baseline calculations in Case 1 to approximately 1.9 in Case 3. Moreover, China's annual average capital share in output is 0.47 which is higher than the standard benchmark of 0.3. Its range varies from 0.45 to 0.58 for the period 1961-2010. This increase in capital share may have resulted from the fall in the prices of the capital goods as compared to the consumption goods (Karabarbounis and Neiman, 2013). China's depreciation rate of the capital stock varies from 2.6% to 3.2% against the 6% depreciation rate used in the previous literature. We use time series of these parameter values in order to explain the patterns of welfare gains overtime.

Figure 15: Welfare gain in China: 1961-2010

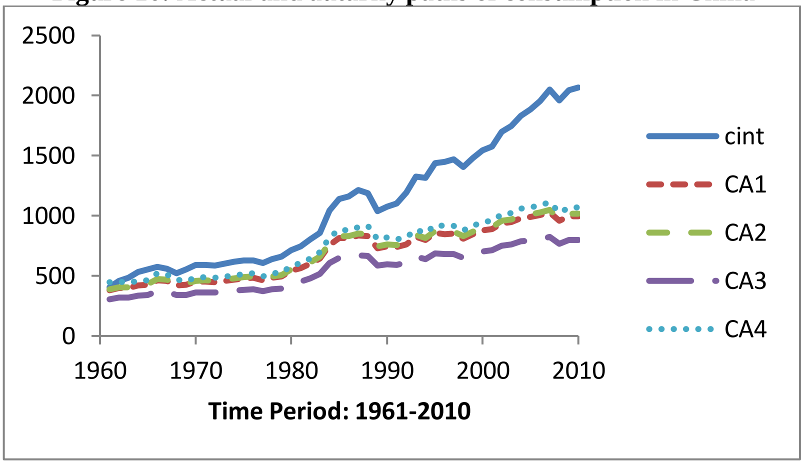


wg1 indicates welfare gains for Case1. Wg2 indicates welfare gains for Case 2. wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

150 We denote welfare gains for individual countries by small letters wg. Welfare gians for the group are denoted by capital letters WG.

In order to provide a more detailed perspective of the patterns of welfare gains we plot actual and autarky paths of consumption and investment profiles for the period 1961-2010. Actual consumption per capita of an economy is considered as consumption under integration. Figure 16 illustrates that China's consumption per capita under integration increases by almost five times based on the data of actual consumption for the period 1961-2010.

Figure 16: Actual and autarky paths of consumption in China

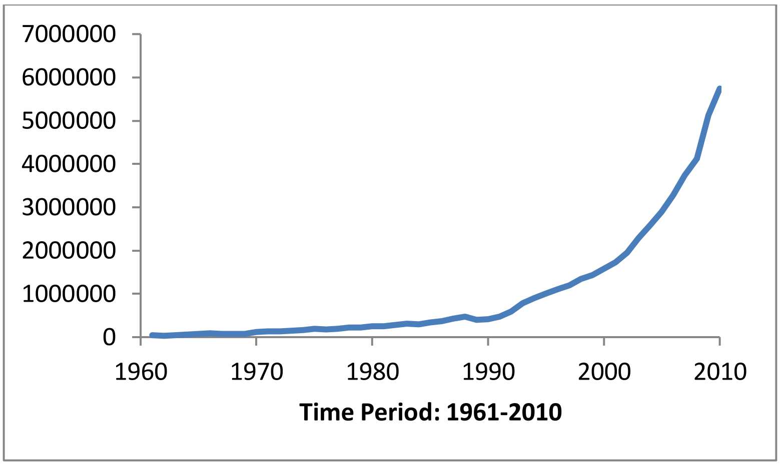


Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1).
CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

It goes up from around $ 400 US to more than $ 2000. If Chinese economy were to remain completely autarkic, per capita consumption would have changed to less than $1000. In fact, the gap between actual and autarky consumption begins to widen in the 1980s but there was a slight fall in the later part of the decade because of political unrest in the country. This gap continues to widen for all cases since the early 1990s, the time when Chinese economy implemented most of the liberalization reforms and experience higher rates of economic growth. Chinese economy grew with an average growth rate of more than 10% over the last two decades from 1991-2010. [151] Observed level of consumption in China for Case 3 exceeds more than two times relative to annual autarky consumption for almost two decades from 1993-2010. Another plausible reason which contributes to this modest increase in welfare gains since the early 1990s is the rise in the volume of investment measured at current PPPs (in millions 2005 US $) in China. Figure 17 explains the patterns of investment in China for the period 1961-2010.

151 This is based on the figures obtained from PWT 8.

Figure 17: Investment patterns in China at constant 2005 national prices (in million 2005 US $).



Source: This is based on the data based on PWT 8.

It shows that investment which is almost negligible at the beginning of the period grows manifold. Over the last 20 years 1990-2010, it increases by more than 12 times to around 7000,0000 million dollars. .[152]The rise in investment is one of the main reasons for China's high GDP growth. It increases at an average rate of 9% for the period 1979-2000. This high growth rate contributes in marked reduction in absolute poverty. It is indicated in the decline of the number of people living below poverty line from 250 million in 1979 to approximately 50 million in 2000 (Rodrik, 2003). If we consider the decade1980-1990 as the period of liberalization in China[153], we may argue that welfare gains from international financial integration are continually increasing for the years 1990-2010 compared to the previous years.

ii. India

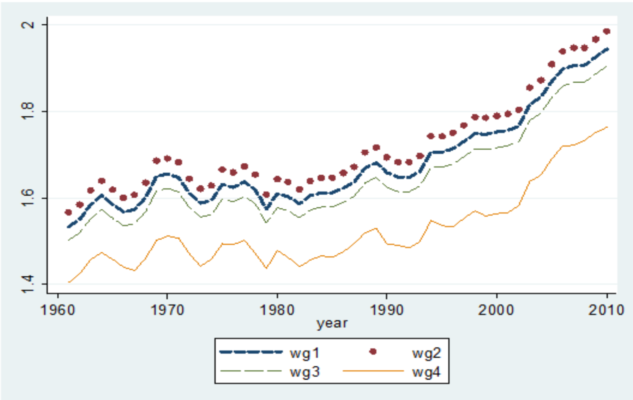
The second country selected for analysis of welfare gains from international financial integration is India considered to be one of the first documented country cases of liberalization in the Asian region. Henry (2007) identifies dates of stock markets liberalization of various Asian economies. As per the dates provided in Henry (2007), Indian economy liberalized in the year 1986 through the introduction of country fund.[154] This was followed by reforms in capital markets in the early 1990s and introduction of liberalization policies in exchanges rates, financial sector institutions and international capital mobility in the late 1990s. Within a short span of time, India's capital market became one of the biggest share markets with 50% share

152 This figure is based on investment derived from capital stocks in PWT 8. Actual capital stocks increase from 833,204 million of dollars in 1961 to 39661528 millions of dollars in 2010 at constant 2005 natinal prices.
153 As mentioned, this is the period in which most of liberalization policies were implemented including capital market and financial sector liberalization. Ariff and Khalid (2005) provides details of all policies implemented in China from 1980-2002.
154 According to Henry (2007), three Asian economies liberalized in the year 1986. Taiwan and Philippines liberalized in May, 1986, while Indian economy liberalized in June, 1986.

in GDP in 1996 compared to 20% in emerging economies. By the year 2002, India's stock market achieves the rank of top 10 well performing capital markets among emerging economies (Ariff and Khalid, 2005).

These patterns of international financial integration generate welfare gains of varying magnitudes over the years in the Indian economy. Figure 18 shows the patterns of welfare gains in India for four cases. It illustrates that the level of welfare gains in Case 2 in terms of observed level of consumption relative to autarky is higher thanthe remaining three cases. In Case 2, we use estimated value of the patience parameter in terms of time discount factor and remaining parameters specific to Indian economy to measure welfare gains for the period 1961-2010. India time discount factor obtained from real interest rates from the equation (3.18) is 0.94 which is different from the benchmark value of 0.96. As a result, India's average annual observed level of consumption relative to autarky increases as its ratio of welfare gains rises modestly from 1.68 of annual consumption from our baseline calculations in case 1 to 1.71 in Case 2. Gourinchas and Jeanne (2003) obtain a benchmark estimate of 1.06% of annual consumption for India. Compared with this estimate, our welfare ratio of observed level of consumption relative to autarky represents a manifold increase in percentage terms.

Figure 18: Welfare gains in India: 1961-2010



wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

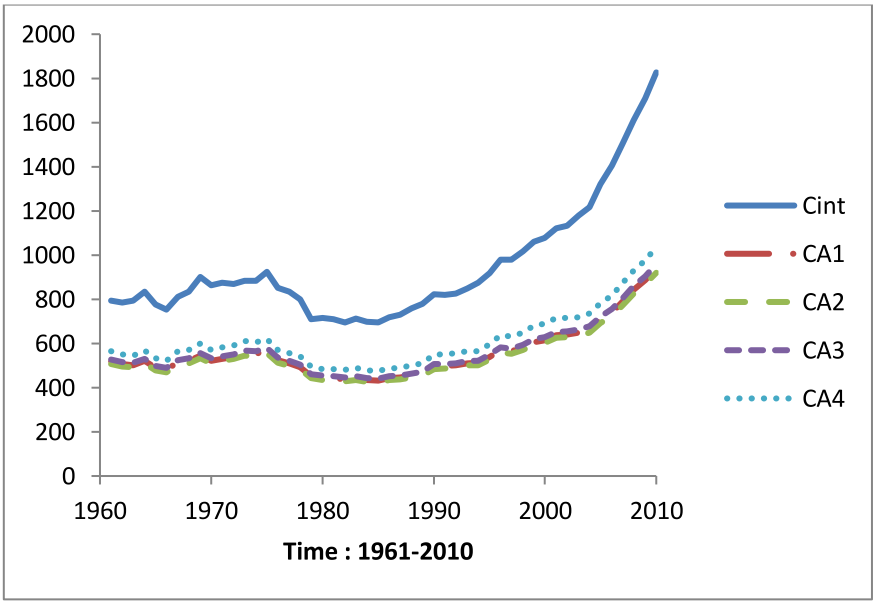
However, India's time preference rate obtained by estimating equation (3.19) is 0.98 which is marginally higher that the bench mark value of 0.96. This relatively higher patience level may result from higher level of savings in India. India gross domestic savings as percentage of GDP have more than doubled over the period 1961-2010. It has increased from 13% in 1960 to more than 36% in 2010.[155] An analysis of India's country based measures

155 We obtain these figures from the World Development Indicators, World Bank.

which go into welfare calculations reveal that its annual average capital share in output is 0.35 which is higher than the standard benchmark of 0.3. It varies from 0.28 to 0.53 for the period 1961-2010. As mentioned in (Karabarbounis and Neiman, 2013), this increase in capital share may have resulted from the fall in the prices of the capital goods relative to consumption goods. This is also evident in the growth of the information and communication goods sector in India which falls in the category of capital goods.[156] India's depreciation rate of the capital stock varies from 3.8% to 6.6% against the fixed value of 6% used in the previous literature. India's depreciation rate is lower in the 1960s. It increases from 3.8% in 1961 to 6.6% in 2008.[157] This high variance in depreciation rate may be result of economic transformation which India undergoes in the 1990s as it starts attracting FDI from other countries. This shows that country-specific parameter values are different than common and constant values used in the previous literature. We use time series of these parameter values in order to explain the patterns of welfare gains within the Indian economy overtime.

To further elaborate the welfare patterns in India, we plot the data of actual and autarky consumption for the period 1961-2010.

Figure 19: Actual and autarky paths of consumption in India



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1).
CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

As mentioned in the theoretical framework, the current study constructs time series of welfare gains in terms of actual consumption relative to derived autarky consumption. Welfare gains

156 One indicator is the growth of the information technology sector growing at the rate of 30% over the last ten years (Goel, 2016).
157 This is based on the data obtained from PWT version 8.0.

result from the differential in the rates of return across countries and over time. In all four cases, we consider flows of capital over time allow this differential to remain for a long period since countries undergo varying degrees of financial integration. Under this more realistic scenario, we evaluate welfare gains without assuming extreme conditions of GJ of perfect financial integration relative perfect financial autarky. This theoretical argument implies that India was not completely closed to capital flows in 1961 nor perfectly open in 2010. In addition, we consider the time period 1961-2010 as limited to assume away the argument of convergence in the neoclassical model. While India started pursuing liberalization policies in the 1980s, it is not regarded as perfectly closed economy in the 1960s. Though FDI inflows were quite lower before liberalization policies were implemented, the Indian economy was receiving sizeable debt inflows in the early years of the analysis. From 1970-1985, its debt flows increased by almost five times from 8645 million US dollars to 42,811 million US dollars.[158] We consider that our relative intermediate setting is more realistic to construct time series of welfare gains for the period 1961-2010 because continuing inflows of capital in various forms over time to developing countries such as India allow differential in rates of return to persist for longer durations. Based on these patterns, we may conclude that India continues to reap benefits of higher consumptionfrom international capital inflows throughout the period 1961-2010.

iii. Israel

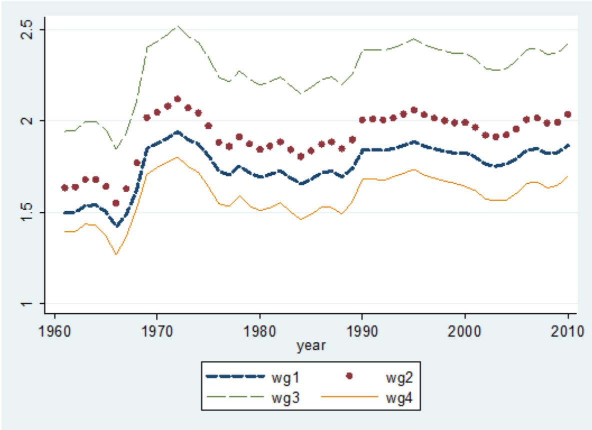
The process of economic liberalization starts in Israel in 1985 with the series of financial reforms known as the 1985 Economic Stabilization Plan aimed at encouraging high growth in the economy. It was introduced in the wake of serious recession in Isreals' economy in the early 1980s. This reform program encourages fiscal stabilization, enhances central bank independence, restricts government intervention in the capital, labour, and financial markets, and regulated monopolies in the economy. Subsequently, the government eased restrictions on the international capital mobility and provided incentives to increase foreign investment. As a result of the implementation of these reforms in 1985-1990 investment surpassed national savings and financial and capital markets became more competitive (Ben-Basaţ, 2002).

Israel is ranked 4th among MFI economies on the basis of of the *de facto* measure of financial integration. Figure 20 shows the patterns of welfare gains in Israel for four cases. It illustrates that welfare gains of international financial integration are higher in the third case

158 This figure is calculated from the database External Wealth of Nations Mark II constructed by Lane and Milesi-Ferretti, 2007.

relative to other cases. In Case 3, we employ estimated value of patience parameter in welfare calculations.

Figure 20: Welfare gains in Israel: 1961-2010



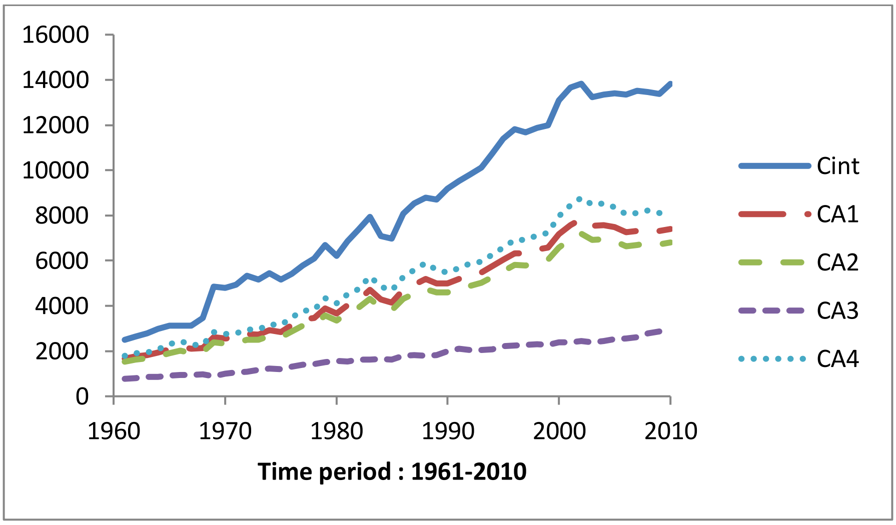
wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

Israel's time preference rate obtained by estimating equation (3.19) is 0.74 which is different from the benchmark value of 0.96. This relatively lower level of patience parameter may result from lower level of savings in Israel. Israel gross domestic savings averaged about 11% of GDP over the period 1961 -2010. As a result, the ratio of welfare gains in Israel rises from 1.75 in our baseline calculations for case 1 to 2.27 in case 3 reflecting an increase in observed level of consumption relative to autarky. Israel's annual average capital share in output is 0.41 which is higher than the standard benchmark of 0.3. Its range varies from 0.38 to 0.44 for the period 1961-2010. Israel's depreciation rate of the capital stock varies from 3.5% to 4.6% against the fixed rate of 6% used in the previous literature. This indicates the sensitivity of country-specific measures to time varying welfare gains in an economy. We use time series of these measures in order to explain the patterns of welfare gains within Israel's economy overtime. An interesting feature of patterns of welfare gains in Israel is that these gains are higher in the early 1970s when observed level of consumption exceeds by 2.5 times relative to autarky consumption in Israel. One possible reason for this higher observed level of consumption relative to autarky is the massive financial support that Israel receives during the Middle East crisis of 1973. [159]

159 During 1973 Middle East crisis, Israel received emergency financial aid from US worth $ 2.2 billion which was used for budget support. In the year 1975, Israel became the largest recipient of US aid (Wegner, 1990). Moreover, according to the figures obtained from World Development Indicators, Israel actually experiences negative savings rates in the early 1970s. This reflects higher level of impatience which may have contributed to higher welfare ratio in the 1970s as well.

Israel's actual per capita consumption grows at an average annual rate of around 4%. Countries with lower values of time preference rate are considered more impatient compared to countries with high values of patience parameter. It means that people would prefer to consume at present instead of consuming in the future. This consumption behaviour observed by households in Israel yield average annual welfare gains of approximately 2.5 times increase in the observed level of consumption relative to autarky consumption in case 3. We plot actual and autarky paths of consumption in Israel for the period 1961-2010 to further explain the patterns of actual consumption relative to autarky.

Figure 21: Actual and autarky paths of consumption in Israel



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1).
CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

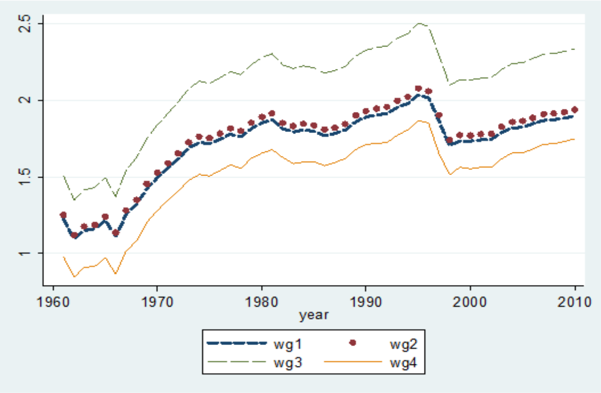
Figure 21 shows that when estimated value of time preference rate is used consumption under autarky falls relative to actual consumption and gap between autarky and actual path of consumption widens, resulting in higher welfare gains for the country. The patterns of welfare gains in Israel fluctuates in the first three decades but show stable growth paths especially in the 1990s in all four cases. We may, therefore, conclude the liberalization of capital flows in Israel contributes toconsistent growth of welfare gains in the last two decades compared to earlier years.

iv. Indonesia

Indonesia is the 5th largest country in terms of population. It pursues its economic liberalization process in various phases andstarts with reforms in foreign sector (1966-70) to encourage more foreign capital and accumulate foreign exchange to support the domestic import requirements. This policy of directed credit caused high inflation and led to the abolition of foreign exchange markets in the second phase (1970-78). In this phase, Indonesian Central Bank was empowered to regulate foreign exchange transactions. The third phase (1978-82) focused on financial sector reforms to foster competition in the financial sector through deregulation and private sector incentives. The fourth phase (1982-1992) focused on capital market reforms which include borrowing of capital from abroad and easing of listing requirements to attract more capital inflows for encouraging growth and welfare of the people. (Ariff and Khalid, 2005). Henry (2007) considers this last phase of reform as the start of the liberalization process and documents that Indonesian economy liberalized in September 1989 through a policy decree.

Indonesia ranks third in terms of *de jure* measure of financial openness and yields average annual welfare ratio 1.70 and 1.73 reflecting higher level of observed consumption relative to autarky for the first two cases respectively.

Figure 22: Welfare gains in Indonesia: 1961-2010

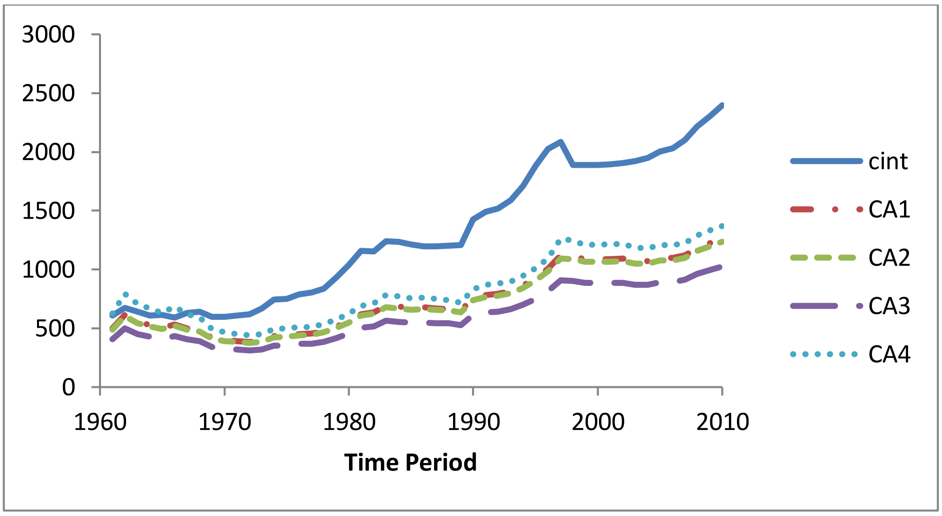


wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

Figure 22 shows the patterns of welfare gains in the Indonesian economy. As is visible from the figure, Indonesia experiences higher welfare benefits from the early 1970s. During this period, observed level of consumption increases by more than two times relative to autarky consumption for the third Case wg3. In case 3, we use estimated value of the patience parameter and remaining parameters specific to Indonesian economy to measure welfare gains for the period 1961-2010. Indonesia's time preference rate obtained by estimating equation (3.19) is 0.78 which is different from the benchmark value of 0.96. As a result, the ratio of welfare gains in Indonesia rises from 1.70 in our baseline calculations for case 1 to approximately 2.1 in case 3. Indonesia's annual average capital share in output is 0.53 and its range varies from 0.52 to 0.55 for the period 1961-2010. This is one Asian economy which has capital share of more than 0.5 for the entire period 1961-2010. This indicates that the dynamics of the structure of an economy are different for every economy. These time specific measures entail different macroeconomic implications. Van der Eng (2010) identifies two potential sources of long term economic growth in Indonesia which include productivity growth and role of gross fixed capital formation (GFCF). During the period 1967-1974, TFP contributes more than 60% in output growth while GFCF accounts for more than 80% contribution in growth for the period 1975-1997. The role of GFCF in economic growth also explains why capital share in income is higher than 0.5 against the benchmark of 0.3 used in previous literature. The time specific data of such measures used in welfare calculations for each economy provides more intuition about welfare gains within countries overtime.

In order to relate welfare effect with the patterns of consumption in Indonesia, we also plot actual and autarky path of consumption for the period 1961-2010.

Figure 23: Actual and autarky paths of consumption in Indonesia



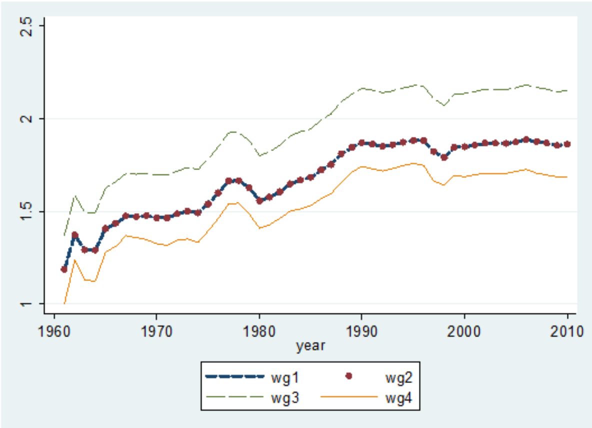
Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1). CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

Indonesia actual consumption increases by more than four times during the period 1961-2010 from less than $ 600 US to $ 2400 US dollars. Under conditions of autarky, this increase in consumption would have been half to that of actual consumption. An interesting feature of the patterns of welfare gains in Indonesia illustrates that ratio of welfare gains rises considerably from 1966 onwards since the start of first phase of reforms aimed at foreign sector liberalization in 1966. This phenomenon is also reflected in the widening gap between actual and autarky path of consumption overtime in Figure 23. It is particularly evident for Case 3 when welfare ratio reaches its peak level of 2.5 in the year 1995. One possible reason for this relatively consistent increase in welfare gains during the period 1967-1997 is the relative stability in growth rates in the Indonesian economy. It grows at an average rate of 8.5% during the period 1967-1974 and 6% during the period 1975-1997 (Van der Eng, 2010). However, welfare gains decline in 1997-1999, a period marked by the Asian financial crises. Indonesian economy suffered a sharp decline in growth rates of 6.5% during this period (Van der Eng, 2010). Based on this discussion, we may suggest that the time series of welfare gains of international financial integration within Indonesia provides more insights regarding the role of country based features in thethe long-term welfare perspective of the economy.

v. Korea

South Korea is one of the MFI economies where per capita income has converged to the level of advanced industrialized countries because it has grown very rapidly than the rest of the world (Aghion and Howitt, 2009). This East Asian economy has grown with an average rate of approximately 8% per year for almost four decades from 1960-1997 (Ishii et al, 2002). Its per capita income which was around 9% of the US per capita income in 1965 reached almost 50% of US income within decades in 1995 (Ariff and Khalid, 2005). It became the member of the Organization of Economic Cooperation and Development (OECD) in 1997 after fulfilling the economic and financial standards required to be a member of this club comprising advanced rich countries.[160] This impressive performance resulted from the dramatic policy shift from import substitution to export oriented industrialization process in the early 1960s (Kim and Park, 1985) and remarkable growth of industries which received priority lending and massive government support in the financial sector (Ishii et al, 2002). Figure 24 shows the patterns and trend of time series of welfare gains for Korea in four different cases.

Figure 24: Welfare gains in Korea: 1961-2010



wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2. wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

The figure shows that Korea experiences a sustained increase in welfare gains of international financial integration in all four cases with brief interruptions and slowdown in some time periods. The era of rapid economic growth in Korea starts in the early 1960s (Kim and Park, 1985) and coincides with increasing welfare gains. The economy of Korea grows

160 Countries' interested in acceding to the OECD are required to follow the framework for accession which outlines the terms and conditions for becoming the member. Details are provided in the framework for the consideration of prospective members at https://www.oecd.org/legal/accession-process.htm

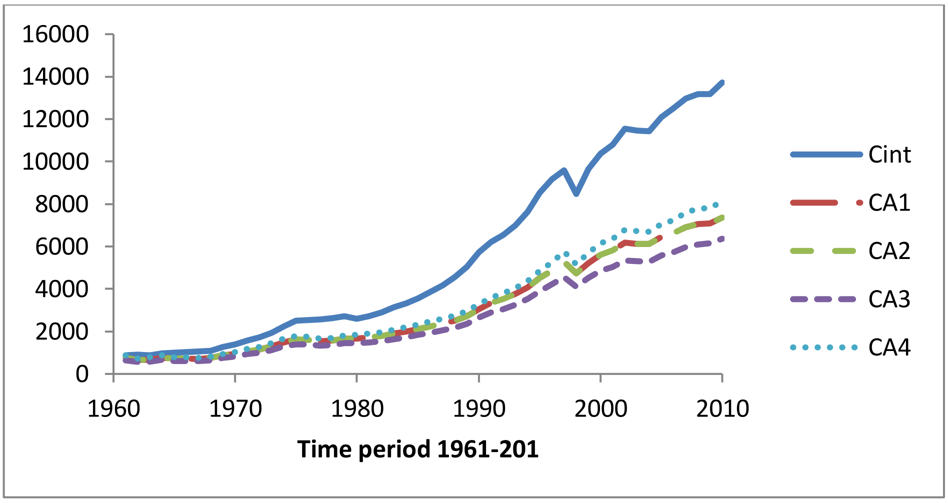
with an average annual growth rate of more than 8.4% for the two decades from 1962-1982. It survives the adverse effects of first global oil shock and subsequent recession in global economy in 1974-1975 by maintaining the momentum of growth rate of 7% to 8% in real GNP (Kim and Park, 1985). However, during the period 1979-1980 welfare gains decline as the ratio of observed level of consumption relative to autarky falls. The reduction in welfare ratio may perhaps result from decline in the growth rate which decreased by 6.2% in 1980. The decline in the growth rate occurs due to host of factors which include fall in agriculture growth in 1980 due to extreme weather conditions and drop in the demand for commodities caused by the second global oil shock in 1979 which necessitated another policy shift in Korea from emphasis on achieving only high growth to promoting price stability (Kim and Park, 1985).

We observe more or less similar trends of welfare gains in Korea in all four cases, however, the magnitude of welfare gains is higher in case 3 relative to other cases. Welfare gains measured for the first two cases wg1 and wg2 are mirror image of each other as the time discount factor calculated from real interest rate data is 0.96 which is equal to the fixed value of this parameter. One possible reason may be low level of variation in prime lending rates in Korea which did not change considerably despite interest rate deregulation policies initiated in the 1990s. Government intervention continues to influence commercial banks' lending practices even after the introduction deregulation of interest rate regime (Ishii et al, 2002). In Case 3, we use estimated value of the patience parameter and remaining parameters specific to Korean economy to measure welfare gains for the period 1961-2010. Korea's time preference rate obtained by estimating equation (3.19) is 0.83 which is different from the benchmark value of 0.96. As a result, the average annual ratio of welfare gains in Korea increases from 1.67 in our baseline calculations in case 1 to 1.94 for case 3. This perhaps reflects the significance of using country-specific patience parameter in measuring welfare gains and explaining the patterns of consumption within countries overtime.

Moreover, Korea's annual average capital share in output is 0.40 which is higher than the standard benchmark of 0.3. Its range varies from 0.33 to 0.47 for the period 1961-2010. One possible reason of the rise in capital share is the growth of the non-residential business sector in Korea. The share of this sector constituting non-residential structures and equipment was 10.2% in 1963. It increases by more than two times to 22.5% over the next two decades (Kim and Park, 1985). This coupled with the rising net private capital inflows in the decades of 1980s contributed enormously in the growth of Korean economy. [161]The impact of these factors appears in welfare calculations through rising share of capital in output which contributes in the differential of rates of returns.

In order to further elaborate the welfare effect and relate it with patterns of consumption in Korea, we plot actual and autarky paths of consumption for the period 1961-2010.

Figure 25: Actual and autarky paths of consumptions in Korea



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1). CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

Korea's actual consumption per capita increases by more than 15 times from $ 890 US to around $ 14000 US dollars for the period 1961-2010. Korea's formal liberalization period is documented as the year 1987 (Henry, 2007). Since 1987 the ratio of welfare gains exceeds 2 in the third case which implies an increase of more than two times increase in observed level of consumption relative to autarky. Autarky would have produced less than half of this consumption effect.[162] We also notice from Figure 25 that the gap between actual and autarky path of consumption is widening in a sustained manner leading to higher welfare gains for the first three cases. Actual consumption per capita has grown at an average rate of 5% per year from 1961-2010. While the overall growth in observed level of consumption has been steady and sustained, it shows a dramatic fall in the years 1997-1998 when it declines by 11% as the

161 Korea's net private capital flows reach the highest level of 8% of GDP in 1988 and result in large current account surplus. As part of capital account liberalization, the government has to encourage capital outflows as current account surplus contributes in appreciation of Korean currency Won. The government also settled foreign loans before the due date (Ishii et al, 2002).

162 We observe that in Korea autarky consumption is also rising relative to other MFI economies. One of the reasons for this rise in consumption under autarky is that Korea also heavily relies on domestic savings which finance a sizeable portion of domestic investment in Korea. Secondly, it is one country which encourages large capital outflows as compared to other Asian economies due to large current account surpluses in the 1980s (Ishii et al, 2002).

Korean economy plunges into a financial crisis. Korea suffers the biggest decline in its GDP growth rate when its economy contracts by 8% in 1998 and approaches the IMF for financial support (Barro, 2001). IMF stabilization program provides Korea with $ US 58.3 billion and emphasize on introducing key structural reforms for macroeconomic stability. Economic reforms introduced under the IMF program in Korea and financial support that it receives from multilateral organizations helps in stemming the financial crisis. By the year 2002, Korea is back on the trajectory of high growth as its economy grows by more than 6% (Ariff and Khalid, 2005) which also corresponds to the rise in the ratio of welfare gains. [163]

Korea's growth and welfare achievements notwithstanding, we must also demonstrate caution in analyzing its experience with welfare gains from international financial integration. Korea pursues capital account liberalization at a slower pace compared to financial sector liberalization. It reinforces the need to have a balanced capital account liberalization policy which should not put at risk the entire financial system of a country. It appears that capital flows contribute to enormous benefits in terms of higher growth and welfare in the Korean economy, however, its capital account liberalization process, raises the concerns that if these flows are not properly regulated, it can result in serious economic and financial crises which Korea faced in 1997-1999.

vi. Summary

Overall our results indicate that country-specific measures are perhaps more relevant for explaining time-varying welfare gains. This approach of analyzing welfare gains in the light of domestic economic conditions and environment provides more insights about why some countries experience higher welfare gains and enjoy the benefits of higher consumption. We observe more or less similar trends in all four cases but the magnitude of welfare gains is different in all cases which emphasize the role of country-specific measures in explaining welfare gains. We primarily focus on time preference rate, capital share in output, depreciation rate of capital, productivity growth and attempt to relate these measures with actual growth experiences to understand the underlying factors affecting welfare gains.

5.3 Selected country experiences from Africa

Out of a group of 22 MFI economies, three countries namely Egypt, Morocco, and South Africa belong to this group from Africa. On the other hand, LFI economies in Africa constitute a larger

163 Asian financial crisis begins when Thailand decided to float its currency Thai Bhat in July, 1997. It spilled to other countries including Korea when its currency depreciated by more than 70% in three months (Ariff and Khalid, 2005). A discussion about the causes as well as its full impact is beyond the scope of this study. We attempt to relate this crisis with our findings of welfare gains. Barro (2001) has comprehensively outlined the causes and effects of the Asian financial crisis.

group compared to Asia. Out of the sample of 29 LFI economies, more than half of the economies are in Africa. In this section, we discuss the country case of South Africa in detail, we also focus on the LFI economies in this region. Table 18 illustrate the four cases of welfare gains for the two specified groups in Africa.

Table 18: Welfare gains in MFI and LFI countries of Africa

Country Groups	No of Series	Mean	Maximum	Minimum	Std. Dev.	Observations
MFIs in Africa	WG1	1.81	2.06	1.49	0.29	3
	WG2	1.81	2.06	1.48	0.30	3
	WG3	1.90	2.25	1.42	0.43	3
	WG4	1.59	1.85	1.22	0.33	3
LFIs in Africa	WG1	1.76	2.32	0.81	0.38	16
	WG2	1.81	2.45	0.76	0.45	16
	WG3	2.64	6.24	1.63	1.14	16
	WG4	1.61	2.23	0.69	0.37	16

Source: Authors Calculations. Note: WG1= welfare gains under Case 1, WG2= welfare gains under Case 2, WG3= welfare gains under Case 3, WG4= welfare gains under Case 4. Observations indicate number of countries included in the sample.

Our results indicate that out of the four cases of welfare gains, observed level of consumption exceeds by more than two times relative to autarky in three cases at different points of time in MFI economies. In case of LFI group, observed level of consumption remains higher by more than two times relative to autarky in all four cases. While average annual observed level of consumption is higher in the third case for both group of economies in Africa, the ratio of welfare gains in case 3 is greater than 2 for the LFI countries. GJ report welfare gains equivalent to 1.65% of annual consumption for a sample of 44 economies. They also suggest that accounting for productivity growth would increase this number by about 50 times than the neoclassical benchmark estimate. Our results fall well within this benchmark and perhaps exceed it for the third case of welfare gains. In the current study, we are focussing on countries which fulfil a certain degree of criteria based on measures of financial integration. The current study, therefore, selects a sample of 19 African economies following (Prasad et al, 2003) to measure welfare gains of international financial integration.

Among the three MFI economies in African region, South Africa experience welfare gains in terms of observed level of consumption which is more than twice relative to autarky in the first three cases. Its mean ratio of stocks of foreign assets and liabilities to GDP is lower compared to Egypt and Morocco. This is a *de facto* measure of financial integration which Prasad et al. (2003) use to classify countries in terms of MFIs and LFIs. South Africa's ratio of stock of foreign assets and liabilities is 0.91 while Egypt and Morocco have a ratio of 1.02 and

0.94 respectively (External wealth of Nations Mark II database, 2011). In terms of *de jure* measure of financial openness, Egypt also shows better performance as the average index of this measure is highest in Egypt followed by South Africa and Morocco. Henry (2007) has not documented any of these three economies in terms of capital account liberalization. We select South Africa as a country case because of relatively higher average annual welfare gains in the MFI group of Africa for the period 1961-2010. It is also one emerging MFI economy in Africa which avoided financial crisis of 1997-1998 (Ishii et al, 2002). In addition, we explain welfare gains in 2 LFI African economies namely Niger and Burkina Faso where average annual observed level of consumption increases by more than 2.5 times relative to autarky. The following sub-sections will explain country cases of welfare gains in Africa.

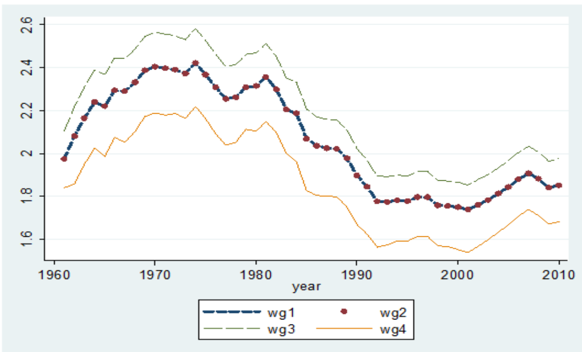
i. South Africa

Prior to democratic transition in 1994, colonialism and apartheid constitute the dominant features of economic and political landscape in South Africa. Following this transition, it becomes one of the big emerging economies with lowest risk spreads and adopts economic policies aimed at better macroeconomic management and reducing economic disparities among the people (Rodrik, 2008). Capital account liberalization process in South Africa starts in 1995. The reforms introduced in the period 1995-98 abolished dual exchange rate system and removed all capital controls for non-residents. These reforms were necessitated by the large swings in the capital account in the 1980s and 1990s. During the early phase of this period (1980-1984), South Africa received capital flows as high as 5% of GDP. However, in the following decade 1984-1994, South Africa experience net outflows of capital as large as 6% of GDP. Capital account deteriorated because of rolling over of external loans and international sanctions in these years. Net private capital flows however recovered again following capital account liberalization in 1995. (Ishii et al, 2002).

Figure 26 shows the patterns of welfare gains in South Africa for all four cases. While we observe more or less similar trends in all cases, an interesting feature of South Africa's patterns of welfare gains is that these gains are higher in the early period of the analysis from 1961-1981 in all four cases compared to subsequent years. There are three main reasons for the fall in the welfare gains in South Africa in subsequent periods. As mentioned earlier, South Africa experiences fluctuations in capital inflows and outflows during the period 1980-2000. There were massive capital outflows equal to 6% of GDP from the South African economy in 1986-1987 (Ishii et al, 2002). Secondly, South Africa's total factor productivity growth which reaches an all high in 1981 experiences continuous decline till 2005. In the year 1981, it was more than 50% higher than the base year 2005 and begins a downward trend afterwards and continues to fall till 2005. [164] Finally, per capita GDP in South Africa grows slowly at the annual average rate of 1.2% for the decade 1994-2004 which can be compared with growth rate of low income economies of sub-Saharan Africa at that time (Rodrik, 2008). This perhaps demonstrates that country-specific conditions and environment are very important in explaining the patterns of welfare gains within economies overtime.

Furthermore, our results show that welfare gains of international financial integration in South Africa are higher in the third case relative to other cases. In Case (3), we use estimated value of the patience parameter and remaining parameters specific to South African economy to measure welfare gains for the period 1961-2010. South Africa's time preference rate obtained by estimating equation (3.19) is 0.90 which is different from the benchmark value of 0.96. As a result, the ratio of welfare gains in South Africa increases from 2.05 in our baseline calculations for case 1 to approximately 2.2 in case 3. Moreover, South Africa's annual average capital share in output is 0.41 which is higher than the standard benchmark of 0.3. Its range varies from 0.40 to 0.47 for the period 1961-2010. The rise in capital share in the mid-1990s is also coincided with increase in unemployment and low rates of per capita GDP growth. Rodrik (2008) explain that non-mineral tradable sector contracts in South Africa during this period which in turn weakens export oriented manufacturing sector of this economy. In addition, South Africa's non mineral tradable sector was labour intensive and employed mostly unskilled labour. The contraction of this sector which also includes manufacturing results in the decline of demand for labour and possibly contributes in the reduction of labour share in come. This also highlights the significance of structural change in analyzing time varying welfare gains within economies over time.

Figure 26: welfare gains in South Africa: 1961-2010

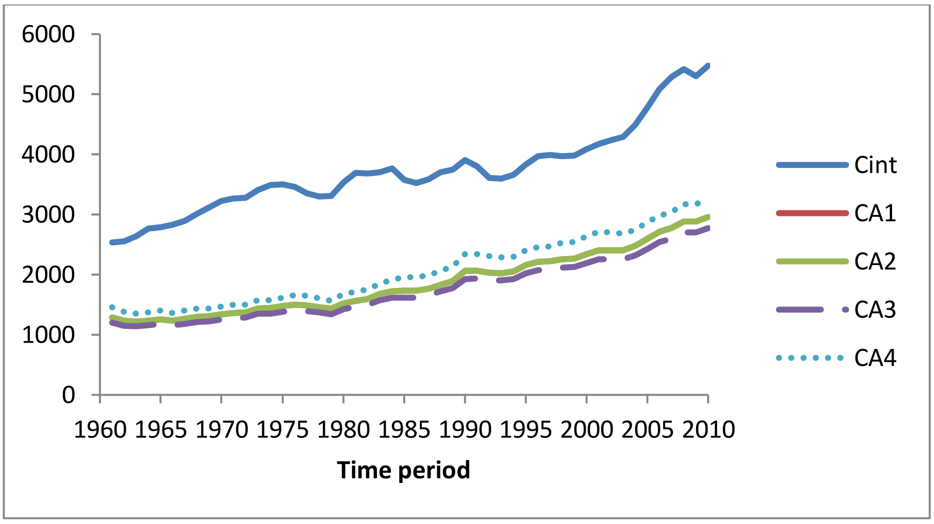


wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

164 This is based on TFP growth figures from PWT8. Equation (3.5) shows that we discount consumption not with time preference rate but also with productivity growth. This leads to a decline in the observed level of consumption relative to autarky consumption.

In order to further explain the patterns of welfare gains we also plot actual and autarky path of consumption profiles of South Africa for the period 1961-2010. Figure 27 illustrates that South Africa' per capita consumption under integration increases by more than two times for the period 1961-2010. During this period, its actual consumption grows at an annual average rate of more than 1.6%.

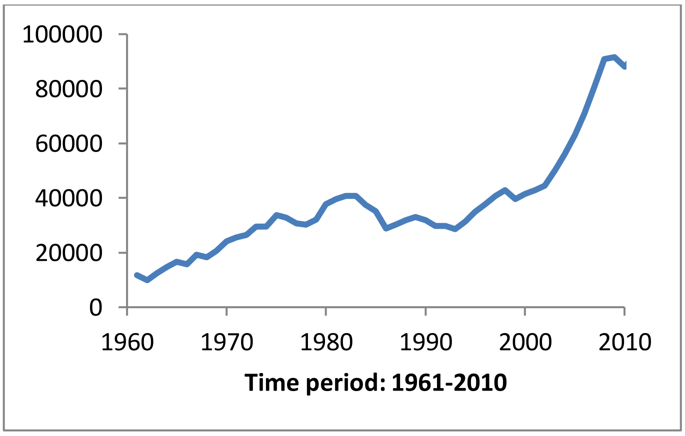
Figure 27: Actual and autarky paths of consumption in South Africa



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1). CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

An interesting feature of South Africa's autarky consumption path reveals that they do not differ for the first two cases of welfare gains since the value of discount factor derived from real interest data is equal to the fixed given value of Case 1. We obtain the value of 0.96 for South Africa from its real interest rates data. However, when we use estimated value of 0.9 for the time preference rate in South Africa, the ratio of welfare gains rises in Case 3 compared to other cases as the gap between consumption under integration and autarky is widened.

Figure 28: Investment patterns in South Africa at constant 2005 national prices (in million 2005 US $)



Source: This is based on the data from on PWT 8.

Figure 28 shows the patterns of investment in South Africa. It illustrates that investment was rising from 1961-1983 before it begins to fall in 1984 when capital outflows bring it down. It starts rising again in the mid-1990s. According to the figures obtained from PWT 8, South Africa's per capita income was close to $ 7000 US in 1981. It continues to fall in the 1980s which may also explain the decline in welfare gains during this period. South Africa achieves this level of income again in 2005. While South Africa was able to regain its peak level of income, it could not achieve the same level of welfare ratio of 1981. Rodrik (2008) explains South Africa needs to focus on improving productivity to translate high level of investment into higher welfare gains. However, the decline in welfare gains also coincides with the decline in productivity in South Africa.[165] Based on this discussion, we may conclude that welfare gains in South Africa are higher during the first two decades followed by a modest decline in the subsequent years. It is against this backdrop that we consider that the time series of welfare gains of international financial integration provides a better welfare perspective to account for various structural and policy changes in an economy over time.

ii. Niger

Out of the 16 LFI countries of Africa, 6 countries which include Benin, Burkina Faso, Burundi, Niger, Senegal and Togo belong to category of the low income countries.[166] While we focus on welfare gains of major MFI economies in Asia and Africa in the previous sections, we are also interested to analyze the patters of welfare gains in low income economies. Some previous studies emphasize that neoclassical gains are small in developing economies, however, countries which are extremely capital scarce benefit more compared to relatively less capital scarce developing countries (GJ; Coueurdacier, et al. 2013). We will start our discussion of welfare gains in low income LFI countries with the sub-Saharan nation Niger categorized as the sixth lowest income economy of the world. [167] Economic reforms in Niger aimed at market deregulation were introduced in the 1990s. One major policy reform was the devaluation of Niger's currency in 1994 which led to higher exports in the economy. These reforms were instituted to gain access to short-term loans and debt relief from multilateral organizations such as the World Bank and IMF. [168]

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165 As mentioned earlier, according to the data obtained from the PWT 8, productivity growth in South Africa begins to decline from its peak level of more than 50% in 1981 compared with the base year of 2005.

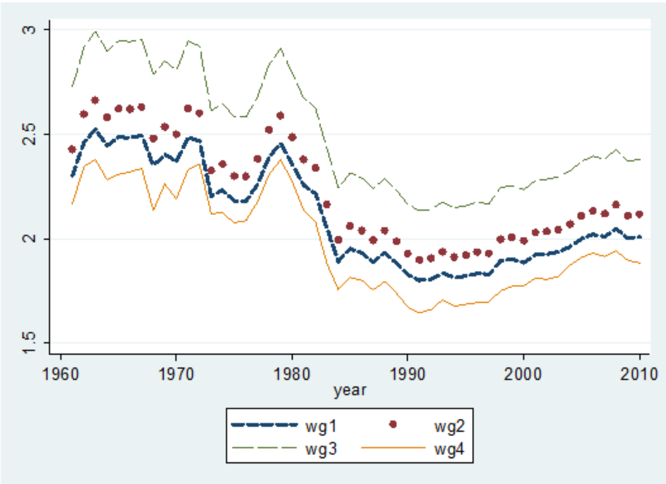
166 This is based on World Bank classification of countries on the basis of per capita income. For more details see https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

167This information is obtained from the World FactBook from the following source: https://www.cia.gov/library/publications/the-world-factbook/geos/ng.html

168 This information is obtained from World Bank Country website http://www.worldbank.org/en/country/niger

Figure 29 shows the patterns of welfare gains in Niger for all four cases. It shows more or less identical trends of welfare gains similar to MFIs, however, the size of gains is larger than MFIs. In Niger, the ratio of welfare gains is also higher in the third case relative to other cases with the use of estimated value of the patience parameter and remaining parameters specific to Niger economy. Niger's time preference rate obtained by estimating equation (3.19) is 0.81 which is different from the benchmark value of 0.96. As a result, Niger's average annual welfare ratio increases from 2.11 in our baseline calculations for Case 1 to 2.50 in Case 3. Furthermore, Niger's annual average capital share in output is 0.43 which is higher than the standard benchmark of 0.3. Its range varies from 0.35 to 0.51 for the period 1961-2010. Niger's depreciation rate of the capital stock varies from 2.9% to 3.8% against the 6% depreciation rate used in the previous literature. We use time series of these country-specific measures from PWT in order to compute welfare gains overtime.

Figure 29: Welfare gains in Niger: 1961-2010



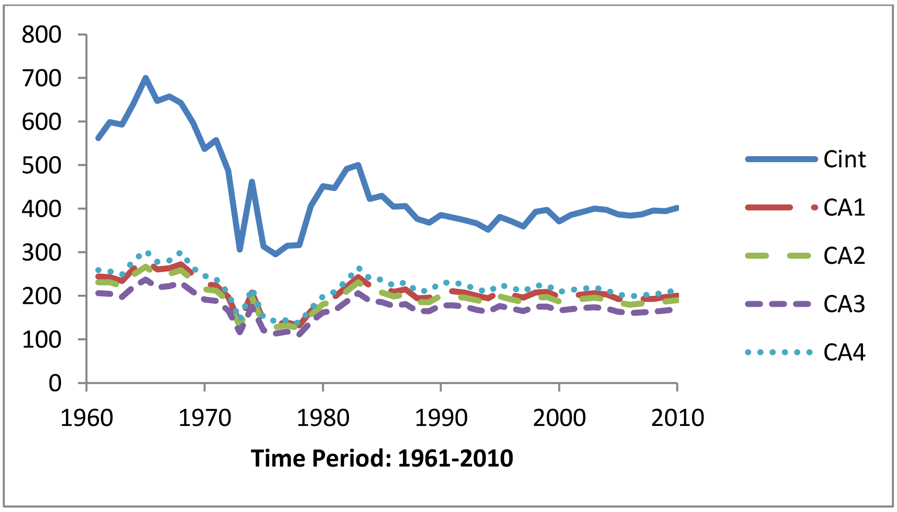
wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

We observe interesting patterns of welfare gains for Niger since observed level of consumption is more than twice relative to autarky for more than two decades in the first half of the analysis for all four cases. These consumption gains fall below the benchmark of 2 after 1984 for cases 1, 2, and 4 respectively. For the third case, however, welfare gains continue to grow in excess of 2 times increase in observed level of consumption relative to autarky for the whole period 1961-2010. We see a visible break which emerges from these patterns between 1961-1980 and 1980 to 2000. There are couple of reasons for this fall in welfare gains in the 1980s reflected in the shrinking gap between actual consumption relative autarky consumption. Niger's economy which experiences very uneven growth rates over the entire period shows dismal performance of very high negative growth rates in the 1980s. For example, in the year

1982 economic growth rate in Niger was positive 1.6%. In the following two years, it was -4% and -16% respectively. Another plausible reason for the fall in the welfare gains could be the peculiar structural change in this economy.[169] It is one of the African economies where capital share declines in the 1990s from 0.47 to 0.35.[170] Hence, high fluctuations in growth rates along with declining capital share may have contributed in the break which is Niger's patterns of welfare gains.

In order to further explain the patterns of welfare gains we also plot actual and autarky path of consumption for the period 1961-2010 in Niger. Figure 30 illustrates that Niger's consumption per capita under integration begins to decline in the mid-1960s.

Figure 30: Actual and autarky paths of consumption in Niger



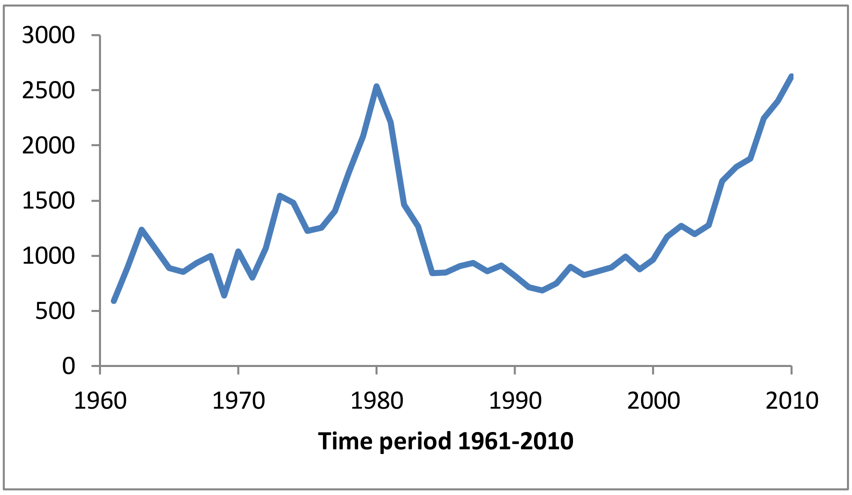
Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1). CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

It continues to decline till 1973 followed by extreme fluctuations in the next decade 1973-1983. It, however, remains steady in the last two decades 1990-2010 but falls below initial levels of consumption observed in early years. Niger's actual consumption per capita which grows by less than 1% on average for the period 1961-2010 reflects wide range of fluctuation in terms of maximum and minimum values of growth. Niger actual consumption per capita grows by more than 50% after recovering from steep decline a year earlier in 1973. This shows how unpredictable is the consumption effect in low income countries and reinforces the argument that welfare gains are better explained through the lenses of country-specific conditions rather than considering common parameters across countries.

169 It is difficult to determine patterns of structural change characterized by the reallocation of labour across economic sectors in a low income economy such as Niger. However, falling share of capital possibly indicates lower level of contribution of capital in output and welfare.

170 These figures on growth and capital share are based on the data obtained from PWT 8.

Figure 31: Investment patterns in Niger at constant 2005 national prices (in million 2005 US $)



Source: This is based on the data obtained from PWT 8

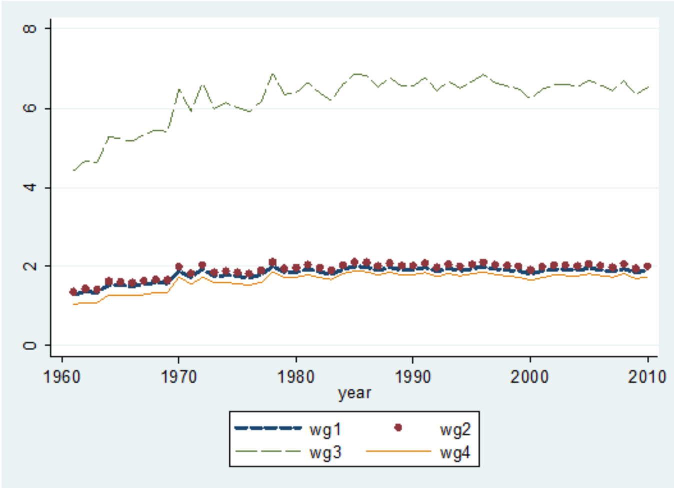
Finally, to explain the patterns of fluctuations in welfare gains for Niger, we plot its investment profiles for the year 1961-2010. Figure 31 shows that investment falls to an all-time low in the mid -1980s and remains stagnant for more than a decade before it starts recovering in the beginning of the last decade. As mentioned earlier, in the last decade, economic liberalization reforms were introduced which enable this LFI economy to access to short-term loans and debt relief from multilateral organizations such as the IMF and World Bank.

iii. Burkina Faso

Burkina Faso is another lowest income country of Africa with the per capita income of less than $ 500 US dollars in the1960s.[171] It starts its economic liberalization process in the mid-1990s aimed at encouraging private sector development through the establishment of a new foreign investment code. It was followed by restructuring of the financial and banking sector in subsequent years (Harsch, E., 1998). Among LFI economies in Africa, Burkina Faso is one interesting case where the annual ratio of welfare gains rises from less than 2 in the first two cases to more than 6 in the third case. In Case 3, we use the estimated value of time preference rate. Figure (32) explains the patterns of welfare gains in this country.

171 This figure is obtained from PWT version 8.

Figure 32: Welfare gains in Burkina Faso

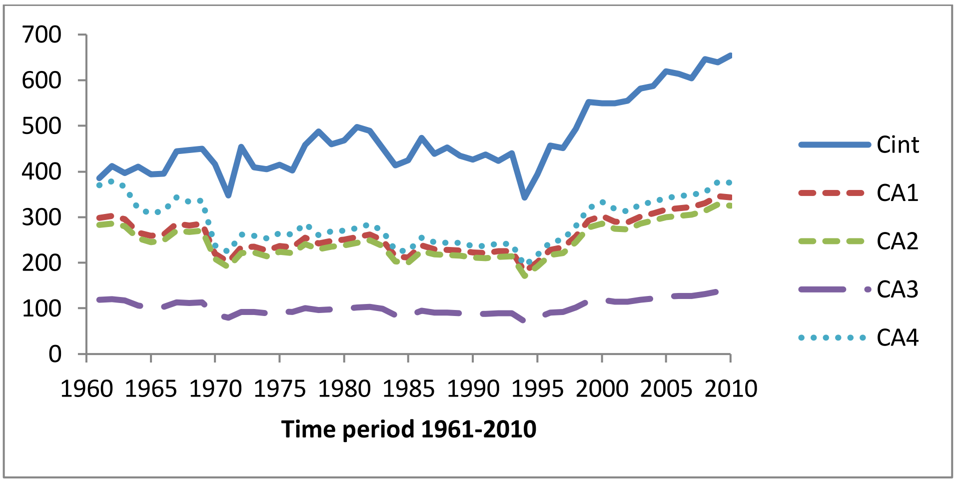


wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

While the figure illustrates more or less similar trends again across various cases of welfare gains, the magnitude of variation in size increases manifold especially for Case 3 relative to other cases. In Case 3, the use of estimated value of patience parameter and remaining parameters specific to Burkina Faso economy increases the observed level of consumption by more than six times relative to autarky from 1970 onwards. Burkina Faso's time preference rate obtained by estimating equation (3.19) is 0.28 which is widely different from the benchmark value of 0.96. This low value of time preference rate may be interpreted with caution. It may result because of very low level of per capita consumption in the economy. However, Wang et al (2016) recently analyze country level variations of time preferences in terms of waiting tendency and find a higher degree of variation across countries from 8% in Nigeria to 89% in Germany. A higher value of the time preference rate indicates that people generally wait for a longer period of time and prefer to consume in the future. In a more capital scarce country such as Burkina Faso, people generally are more impatient and tend to consume more at present instead of in the future. This may have caused manifold increase in the welfare ratio for Burkina Faso. In addition, Burkina Faso's annual average capital share in output is 0.35 which is higher than the standard benchmark of 0.3. Its range varies from 0.31 to 0.44 for the period 1961-2010. This is perhaps a significant variation for a small economy of Burkina Faso. Its depreciation rate of the capital stock varies from 2.4% to 3.6% against the 6% depreciation rate used in the previous literature. These country-specific measures are used in the calculations of rates of return and subsequently consumption under autarky to measure welfare gains over time.

To further elaborate the patterns of welfare gains we also plot actual and autarky path of consumption profiles in figure 33 for the period 1961-2010.

Figure 33: Actual and autarky paths of consumption in Burkina Faso

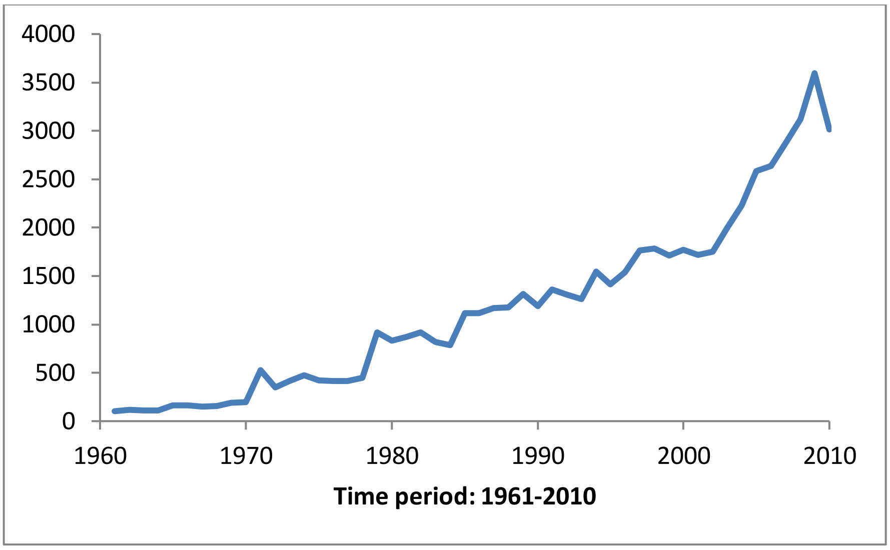


Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1).
CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

The figure illustrates that per capita consumption in Burkina Faso fluctuates within in the range of $ 385-450 for the first 34 years from 1961-1994. However, it almost doubles during the last 15 years from $ 340 US per capita to around $ 700 US dollars. This low level of consumption and uneven increase in the last decade possibly widens the gap between actual consumption relative to autarky with the use of estimated value of time preference rate to calculate the implied welfare gains.

In addition, we look at the patterns of investment in Burkina Faso, for the period under consideration. Figure 34 shows investment profiles in Burkina Faso for the period 1961-2010. It increases from $ 100 million to more than $ 4000 million dollars reflecting that the economy is receiving capital flows in various forms from abroad. Since 1990s, investment increases with an average annual growth of more than 5%. This rise in investment over the last two decades contributes to the economic growth rate as well as increasing capital share in the economy. In the last two decades 1991-2010, the economy of Burkina Faso grows by more than 5% on average and its capital share increases from 0.34 to 0.44 indicating an increase of almost 30%. This is considered a significant change given negative growth rates and constant capital share in the early years. We may suggest that these country-specific factors in Burkina Faso which include rising investment and capital share in the economy overtime have contributed to manifold increase in welfare gains over the last two decades.

Figure 34: Investment patterns in Burkina Faso at constant 2005 national prices (in million 2005 US $)



Source: This is based on data obtained from PWT 8.

vi. Summary

The two cases of LFI economies such as Niger and Burkina Faso raise interesting questions of what causes a change in implied welfare gains from the time series perspective of low income economies. If as mentioned in the previous literature that very capital scarce economies can realise potentially large welfare benefits from international financial integration, it is also very important to identify factors affecting those benefits over time. We may suggest that large welfare gains in LFI economies remain susceptible to uneven patterns of growth and consumption. We observe these features in Niger and Burkina Faso since they experience different phases of growth of consumption in different time periods. We conduct this welfare analysis in an attempt to obtain more policy relevant insights about the impact of international financial integration on welfare gains of specific low income economies undergoing structural transformation over time.

5.4 Selected country experiences from Central, Latin America and the Caribbean

Out of a group of 22 MFI economies, 7 economies which include Argentina, Brazil, Chile, Columbia, Mexico, Peru and Venezuela belong to Central, Latin America and Caribbean. It includes two high income economies namely Argentina and Chile and four upper middle income economies such as Brazil, Columbia, Mexico and Venezuela. [172] On the other hand, 10

172 Three Latin American countries namely Ecuador, Panama and Paraguay also fall in the category of upper middle income economy but they are classified as LFIs. We follow World Bank classification on the basis of income available at https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

LFI economies are located in this region. Table 19 shows all four cases of welfare gains of MFI and LFI countries in the Central, Latin America and Caribbean.

Table 19: Welfare gains in MFI and LFI countries of Central, Latin America and Caribbean

Country Groups	No of Series	Mean	Maximum	Minimum	Std. Dev.	Observations
MFIs in Central, Latin American, and Caribbean	WG1	1.90	2.02	1.72	0.10	7
	WG2	2.06	2.75	1.79	0.34	7
	WG3	2.11	2.27	1.98	0.12	7
	WG4	1.74	1.94	1.53	0.14	7
LFIs in Central, Latin American, and Caribbean	WG1	1.73	1.98	1.01	0.30	10
	WG2	1.84	2.13	1.01	0.35	10
	WG3	2.13	3.02	1.24	0.51	10
	WG4	1.55	1.79	0.96	0.27	10

Note: WG1= welfare gains under Case 1, WG2= welfare gains under Case 2, WG3= welfare gains under Case 3, WG4=welfare gains under Case 4. Observations indicate number of countries included in the sample.

Our results indicate that average annual observed level of consumption increases by more than two times relative to autarky in two out of the four cases. The ratio of welfare gains in Latin American region exceeds the level of 2 when we use country-specific value of time preference rate in case 2 and 3. Overall, the mean welfare ratio in Latin America is higher than other regional groups of Asia and Africa. Latin America is the second largest recipient of net capital flows after Asia. It receives average net flows of more than \$ 27,525 million US as compared to \$ 35,452 million US in Asia for the period 1970-2010.[173] The stylized facts explained in the introduction also highlight that a number of MFI economies are ranked in the list of top five economies in different measures of financial integration.

We find higher gains from integration in Latin America in contrast to the findings of Gourinchas and Jeanne (2003) who report lowest gains in Latin America relative to other regions. They report welfare gains of less than 0.4% of annual consumption for a sample of 22 economies.[174]This number would be 50 times larger (20%) if productivity growth is also accounted for in the welfare measure. Compared with this benchmark, a rise in the observed level of consumption by more than two times relative autarky for many countries indicates a higher level of welfare gains. In the current study, we are focusing on countries which fulfil a certain degree of criteria based on measures of financial integration. It, therefore, selects a sample of 17 Central, Latin America and Caribbean economies following (Prasad et al, 2003)

173 This figure is obtained from Jeanne et al (2012). They calculate this figure based on International Monetary Fund, International Financial Statistics Database, 2011.

174 We measure welfare gains in terms of a ratio. GJ measure welfare gains in terms of percentage change in consumption. Though our welfare benchmark is different, even in percent terms welfare gains in the current study are higher than GJ. We compute welfare gains as a ratio as we are interested in using this measure in analyzing the short run and long relationship with trade.

to measure welfare gains of international financial integration. The following subsections explain the patterns of welfare gains for countries in Central and Latin America. In order to analyze the elements of country specificity in welfare gains, we select two MFI and one LFI economies from this region.

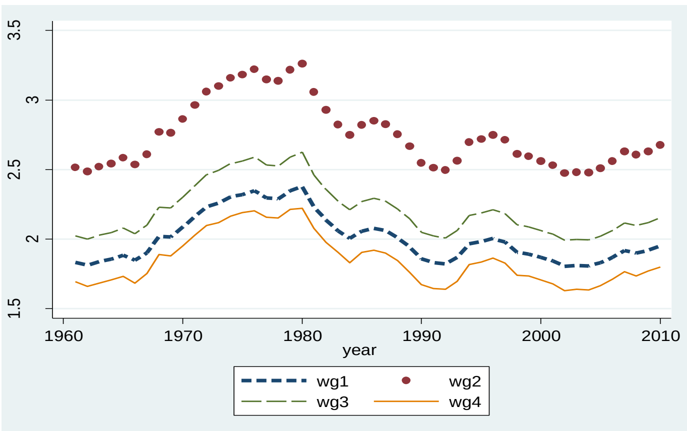
i. Brazil

Brazil predominantly known as a primary-exporter country before the 1960s is the 8th largest economy today. The process of structural transformation in Brazil starts in the early 1960s since it makes its transition from an agrarian to an industrialized economy. It adopts a series of economic and financial sector reforms in 1964 aimed at promoting the domestic banking sector to facilitate economic growth and development (Dalto, 2008). Though Brazil was receiving sizeable capital flows from abroad, capital account liberalization was initiated in 1988. Brazil received capital flows equivalent to almost 3.8% of GDP from 1974-1982. However, the bulk of these capital flows comprises external debt while portfolio investment was insignificant. These capital inflows contributed in debt accumulation and macroeconomic volatility (Goldfajn and Minella, 2005). Indeed, one of the main reasons to liberalize the capital account was to reduce the volatility of the capital flows in Brazil. Brazil's documented date for liberalization of capital account through a country fund is 1988 (Henry, 2007).

Brazil is yet another country case which supports the argument of constructing time series of welfare gains. As mentioned in the theoretical framework, the current study, constructs time series of welfare gains for the period 1961-2010 by comparing the actual consumption relative to autarky. Welfare gains result from the differential in the rates of return across countries and over time. In all four cases, we consider flows of capital over time allow this differential to remain for a long period in countries undergoing varying degrees of financial integration. Though Brazil starts pursuing its capital account liberalization policy in 1988 the magnitude of capital flows in the 1970s shows that it cannot be regarded as a perfectly closed economy. While we are not investigating welfare gains in economies converging to balance growth paths very rapidly as in neoclassical model, we are only interested in using the argument of capital mobility of this framework to construct time series of welfare gains. Following Hoxha et al. (2008), we consider time period 1961-2010 as limited in order to assume away the argument of convergence in the neoclassical model. This allows us to explain elements of country specificity in welfare gains through derived autarky consumption within countries overtime.

We select the country case of Brazil because it is one MFI economy of Latin America in which annual average ratio of welfare gains exceeds 2 in three out of the four cases. It implies more than two times increase in observed level of consumption relative to autarky. Figure 35 presents the patterns of welfare gains in Brazil for the period 1961-2010. It shows that welfare gains of international financial integration for the second case wg2 are higher relative to other cases. In Case 2, we use computed value of the patience parameter in terms of time discount factor and remaining parameters specific to Brazilian economy to measure welfare gains. Brazil's time discount factor obtained from real interest rate data using equation (3.18) is 0.70 which is different from the benchmark value of 0.96. As a result, average annual welfare ratio in Brazil increases from 2 in our baseline calculations of Case 1 to 2.74 in Case 2. Brazil is the only country in MFI group of Latin America for which welfare ratio exceeds 3 at different points in time for the period 1961-2010. This high welfare ratio indicates more than three times increase in observed level of consumption relative to autarky. As mentioned earlier, Brazil received capital flows equivalent to 3.8% of GDP during the period 1974-1982. These capital flows coupled with the lower value of time discount factor may have contributed in higher observed level of consumption relative to autarky. The average value of time discount factor used in computing autarky consumption is 0.70.[175] The maximum and minimum value of this time discount factor is 0.83 and 0.56 respectively which is below the given fixed value of 0.96. The Case 2 of welfare gains is significantly different for Brazil since the value of time discount factor derived from real interest rates data is lower relative to other countries. This may be due to the high interest rates that the economy of Brazil experiences than other emerging market regimes (Segura-Ubiergo, 2012).[176]

Figure 35: Welfare gains in Brazil: 1961-2010



wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

175We derived this value from real interest rate data for Brazil from 1997-2014 which is available from WDI source. If we use data from 1997 to 2010 the value of discount factor is 0.67 which is lower than 0.70.

176 Real interest rates in Brazil were more than 25% in 1996. Though interest rates decline over the decade 1995-2005, they still remain higher than 10% (Seguro-Ubiergo, 2012).

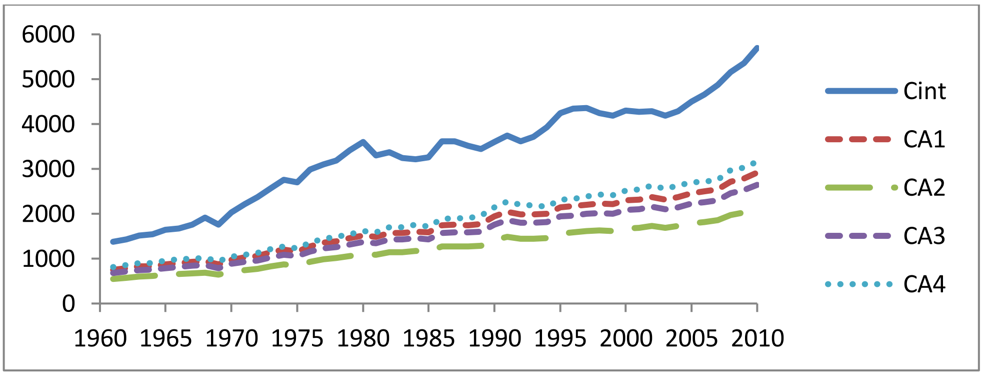
Furthermore, the ratio of welfare gains in Brazil is also higher in case 3 than our baseline calculations for case 1. In case 3, we use the estimated value of time preference rate. Brazil's time preference rate obtained by estimating equation (3.19) is 0.87 which is also lower than the benchmark value of 0.96. The fall in the value of the time discount factor shows that people are more impatient as compared to the fixed value of 0.96. A lower value of patience parameter (β) decreases consumption under autarky. As a result, the mean ratio of welfare gains in Brazil increases from 2.00 in our baseline calculations for case 1 to 2.21 in case 3. Brazil's average capital share in output is 0.45 which is higher than the standard benchmark of 0.3. Its range varies from 0.42 to 0.48 for the period 1961-2010. While capital share remains stable during the first three decades, the variation in it occurs in the last two decades. Brazil's depreciation rate of the capital stock varies from 3% to 3.6% against the fixed rate of 6% used in the previous literature. These factors along with output capital ratio affect welfare gains through rates of return.

In order to seek more insights about the patterns of welfare gains, we relate ratio of welfare gains in Brazil with its capital output ratio. Its average capital output ratio is 3.30 and its lies between 2.2 and 4.7. The ratio of welfare gains in Brazil is higher than 2 for 9 years (1971-1979) when its capital output is more than 4. The welfare ratio falls with the decline in the capital output ratio. It drops to below 4 in subsequent years. We observe that falling levels of investment particularly in the 1980s contribute to the reduction of capital stocks. According to GJ, capital output ratios of less 1.29 and more than 4.38 contribute towards welfare gains of 2% of annual consumption. We may suggest that this higher and lower limit can be different for different countries when welfare gains are measured over time. Thus, the welfare ratio is higher in Brazil from 1971 to 1979 because of higher level of capital stocks relative to output in the economy. However, capital stocks decline in the 1980s relative to output which may have led to the fall in the capital output ratio and corresponding fall in welfare gains in Brazil. In addition, Brazil's real GDP grows by more than 9% in 1980. From 1981-1984, Brazil experiences a negative growth of 4% and 2% in 1981 and 1983. These elements of country specificity emphasize the role of domestic economic conditions in welfare gains and provide more insights about factors driving welfare gains within countries overtime.

Finally, in the fourth case, welfare gains decline as compared to previous three cases, but still remain times higher than the benchmark estimate of permanent consumption reported by GJ for Latin American economies. This decline results from the use of the substitution parameter $\epsilon < 1$ in which capital types are not perfectly substitutable and marginal product of any single type of capital is not completely insensitive to stock of capital in the economy. It, thus, highlights yet another element of country specificity in explaining welfare gains in the light of respective macroeconomic conditions of the economy.

In order to further explain the patterns of welfare gains in Brazil, we also plot actual and autarky path of consumption for the period 1961-2010. Figure 36 shows the integrated and autarky consumption within Brazil overtime. Actual consumption has gone up by almost five times for the period 1961-2010. People living under autarky conditions would have experienced half of this consumption effect. Put differently, a family in Brazil enjoys almost twice the benefits of higher consumption in 2010 relative to the family of 1961.

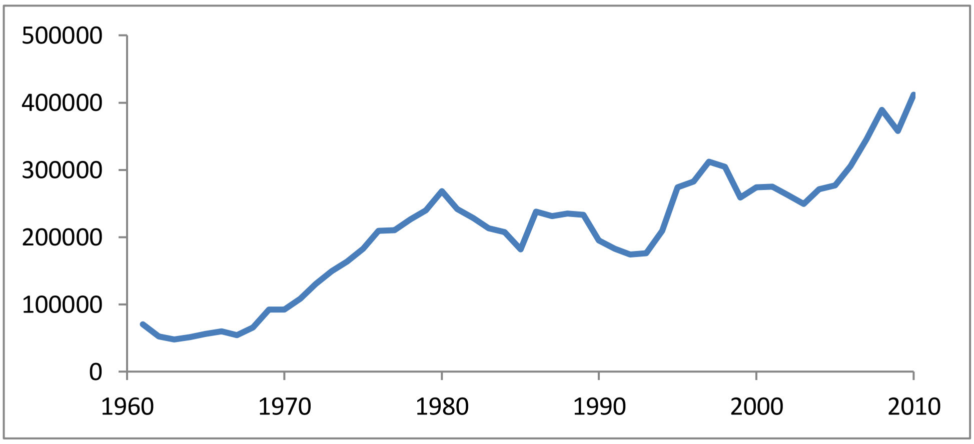
Figure 36: Actual and autarky paths of consumption in Brazil



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1). CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

Figure 37 shows the trend of investment in Brazil for the period 1961-2010. An interesting feature illustrated by this figure is that investment is continuously rising till 1980. Welfare gains in Brazil in terms of observed level of consumption relative to autarky were higher during this early period. This indicates the contributory role of capital mobility in welfare gains. However, international capital flows in the form of loans also contributed in debt accumulation which led to the 1982 debt crisis in Brazil.

Figure 37: Investment patterns in Brazil at constant 2005 national prices (in million 2005 US $)



Source: This is based on the data obtained from PWT 8.

This leads to the fall in economic growth rates and decline in welfare levels in the following decade of 1980s which is evident from figure 35. The period 1990-2000 shows mixed trend with regard to the GDP growth, rise in capital flows and welfare gains. Brazil experiences higher inflationary trends during this period. Inflation was at record high in 1990 when it reaches more than 80%. This higher inflationary trend was arrested with the introduction of the Real Plan in the year 1994. This plan aims at stabilizing the domestic currency in nominal terms in order to curb inflation and restore growth in the economy. This coupled with the Brady Plan which converted loans into debt securities in Brazil in 1994 leads to the appreciation of effective exchange rate and eventually higher capital flows in Brazil towards the end of the decade (Goldfajn and Minella, 2005).[177] During this period, Brazil largely attracts foreign portfolio investment compared to the loans in earlier periods which may have contributed in the rise of actual consumption in Brazil and stability in welfare gains. Based on this discussion, we may suggest that international capital flows generate welfare gains of varying magnitude in different time periods. These gains were higher in Brazil during the period 1961-1980 relative to the following two decades. One may argue that there are additional factors responsible for this variation in welfare gains, the point of this study, however, is to highlight the significance of time series perspective whichprovides one way of explaining welfare gains within countries over time.

ii. Mexico

Mexico was regarded as a highly protectionist economy till the 1970s when government followed policy of import substitution strategy to support growth of domestic manufacturing sector in the country. The import substitution strategy based on infant industry argument seeks to develop industries which have a potential comparative advantage and cannot compete with the well-developed industrial sector of advanced economies. As a result, industrial sector grows rapidly in Mexico with the focus on inward looking development approach. Between 1985 and 1988, Mexico reversed its import substitution priorities by dramatically reducing tariffs and eliminating import quotas in order encourage exports sector in the economy (Krugman et al, 2012). In 1989, the year considered as the documented date of capital account liberalization (Henry, 2007), Mexico removed restrictions on the participation of foreign capital through a policy decree to attract more foreign capital in the economy. These policies of promoting free

177 Brady plan implemented in many Latin American economies in the late 1980s and early 1990s envisages conversion of loans into debt securities through Brady bonds. It enables commercial banks to exchange their claims on developing economies into tradeable instruments. It was proposed the then US Treasury Secretary Nicholas Brady. Brazil under this was able to convert loans into sovereign bonds (Goldfajn and Minella, 2005).

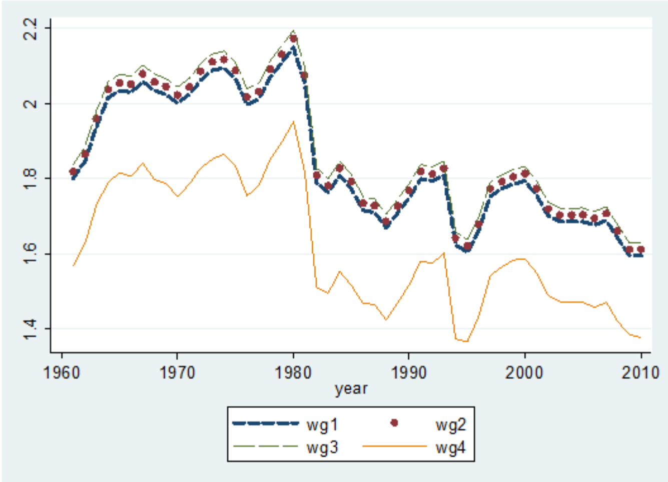
trade along with liberalized foreign investment regime are aimed at achieving sustained and speedy growth in the country (Ishii et al, 2002).

Mexico's capital share in income which remains constant for the period 1961-1994 begins to increase as well from the year 1995. Its annual average capital share in output is 0.58 which is higher than the standard benchmark of 0.3. Its range varies from 0.56 to 0.63 for the period 1961-2010. This relatively higher share of capital throughout the period may be due to the import substitution industrialization strategy which Mexico followed till the 1970s aimed at promoting domestic manufacturing sector. Mexico's depreciation of the capital stock varies from 3.3% to 4.3% against the fixed 6% depreciation rate used in the previous literature. These two parameters along with output levels and capital stocks affect the differential in rates of return. The rates of returns calculated using country-specific measures exceed the world rate of return allowing continual capital inflows in the economy. However, domestic economic conditions and policies which dictate output growth and patterns of consumption over different phases generate considerable fluctuations in welfare gains within Mexico overtime.

We relate these economic changes in Mexico's economic landscape with the patterns of welfare gainsfor the period 1961-2010. Figure 38 shows the time series of welfare gains in Mexico for all four cases. We observe more or less similar trend and magnitude of welfare gains for the first three cases. This is perhaps because of a small change in the value of calculated and estimated value of time preference rate in case 2 and 3 respectively relative to fixed value of 0.96 in Case 1. Mexico's time preference rates obtained in the second and third cases are slightly lower than the benchmark value. In Case 2 it is 0.95 while in case 3 it is 0.94. The average annual ratio of welfare gains in Mexico increase modestly from 1.84 in our baseline calculations in case 1 to 1.86 in case 2 and 1.88 in Case 3. In the fourth case, however, the trend is also similar, but the magnitude is different since the welfare ratio declines when we consider that capital varieties are not infinitely substitutable.

While the trend and magnitude may have been uniform across the first three cases in Mexico, the variation in the size of welfare gains is quite substantial over the years. As is visible from figure 38, Mexico's welfare gains are higher for the first two decades relative to following years. During this period, the ratio of welfare gains exceeds 2 for most years in the first three cases. The period of 1960s is considered as a phase of "stabilizing development" in Mexico as government pursued economic policies which contributed in impressive average growth rates of 3%-4% in GDP per capita. In addition, Mexico experiences a significant structural change in its economy as its share of industry in total output increased from around 21% in 1950 to 30% in 1970. The higher capital share in Mexico observed since the 1960s may have resulted from the relatively early structural transformationin the 1950s. This somewhat stable phase of growth characterized by sound macroeconomic management attracted foreign capital in the form of direct investment with less emphasis on external borrowing (Lustig, 2000). This was one of the possible factors of higher welfare ratio in Mexico during the first two decades.

Figure 38: Welfare gains in Mexico: 1961-2010



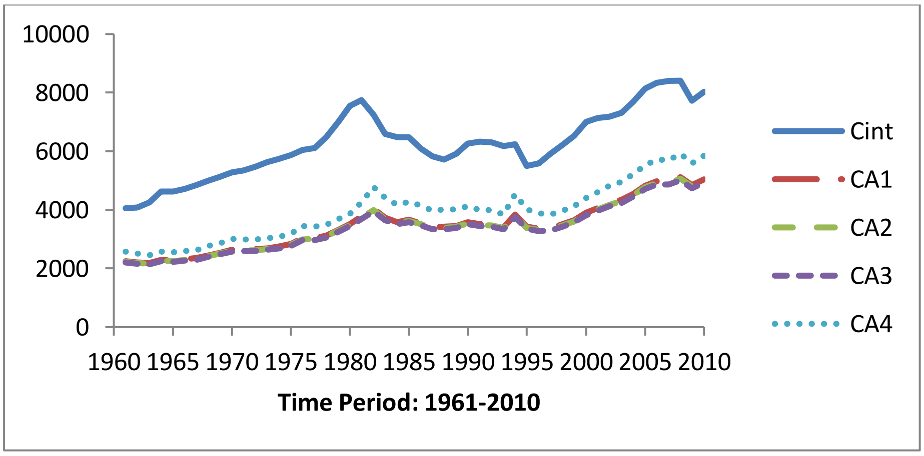
wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

This impressive economic performance continued till the mid-1970s when expenditures started exceeding government revenues leading to large fiscal and current account deficits and higher inflation in subsequent years. However, at about the same time, there were massive oil discoveries in Mexico in 1978. It was widely expected that the oil boom will hold out immense economic opportunities for Mexico for smooth and sustained economic growth in years to come. The government used oil as a tradable good to boost Mexico's economic growth and overcome fiscal and current account deficit. This leads both public and private sector to invest heavily in various economic sectors of Mexican economy, with the public sector constituting the bulk of share of this investment portfolio. This public sector led growth produced impressive growth rates of more than 8% from 1978-1981 (Lustig, 2000). These factors continue to contribute in higher welfare gains in excess of two times increase in the observed level of consumption relative to autarky.

However, this optimism of high and sustained growth was also short-lived. The domestic currency in Mexico became highly overvalued a phenomenon which typically accompanies natural resource based economic expansion and lead to balance of payment disequilibrium. Over reliance on export of oil proceeds further compounded Mexico's economic problem when prices of oil fell in 1981 against policy makers' expectations (Griffith-Jones, and Sunkel, 1986). Consequently, welfare gains begin to fall as Mexico was hit a by severe crisis in 1982 leading to massive devaluations of the currency Peso, chaos in financial market which occurs due to nationalization of banks and the resulting slowdown in domestic economic activity. The decline in the ratio of welfare gains in 1982 also corresponds with the massive capital flight of more than $ 10 billion US from the economy (Lustig, 2000). These economic changes explain the phenomenon of declining welfare gains observed mostly in the 1980s due to debt and currency crisis of 1982.[178]

In order to further explain the patterns of welfare gains in Mexico, we plot actual and autarky path of consumption in Figure 39 for the period 1961-2010. It illustrates changes in observed level of consumption relative to autarky and degree of volatility in it in all four cases. We see that average actual consumption in Mexico grows from 2.41% in the first decade 1961-1971 to almost 4% in per capita terms in the subsequent decade 1971-1981. This perhaps corresponds to more than two times increase in observed level of consumption relative to autarky. Average annual actual per capita consumption falls by 2.2% in the next decade 1981-1991. This fall in consumption due to the economic crisis of 1982 contributes to the reduction of welfare ratio in Mexico. Growth in consumption remains negative during the next five years before it begins to grow in 1995. Mexico was able to achieve its peak level of consumption of 1981 again in 2005. The volatility in consumption along with uneven growth rates in the early 1990s also explains the relative decline in welfare gains in Mexico in 1990s. Growth rates continue to fall in Mexico from 5% in 1990 to 1% in 1993 before eventually collapsing to a negative 6% in 1995. [179]

Figure 39: Actual and autarky paths of consumption in Mexico



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1).

CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

178 During this crisis, Mexico closed its exchange rate markets and unilaterally declared moratorium on the payment of its loans. Griffith-Jones, S. and Sunkel, 1986 explain in detail the history of the crisis in Latin America including Mexico.

179 We calculate these figures from the data obtained from PWT 8.0.

We may also relate the fall in actual consumption and consequent decline in welfare gains in the early 1990s with financial crisis of 1994 and role of capital flows during this crisis. Before the eruption of the financial crisis of 1994, Mexico was receiving capital flows equivalent to 7% of the GDP. These massive capital flows were the result of Brady debt reduction plan which Mexico signed in 1990 and used to finance current account deficits (Edwards and Savastano, 1998). At the same time, the exchange rate appreciated enormously by almost 60% in 1994 compared with the 1988 exchange rate level (Calvo and Mendoza, 1996). Theoretically, an increase in capital flows leads to a rise in the real exchange rate (Edwards and Savastano, 1998). Dornbusch (1993) suggest that real appreciation of Peso in Mexico of this magnitude is not sustainable in the long run. The government of Mexico did not pay heed to the argument that large levels of capital flows which accompany high appreciation in exchange rate are not sustainable in the long run. When Mexico could not maintain the pace and momentum of capital flows in the year 1994, its natural corollary would be the depreciation of the exchange rate. It was expected that depreciation of Peso within the range of 20% to 30% will restore equilibrium. However, Mexico plunged into another currency crisis in 1994 when Peso lost one half of its value (Edwards and Savastano, 1998).[180]

The case of Mexico also indicates that financial liberalization measures should be accompanied by proper regulatory and supervisory standards to hold back financial institutions from taking unnecessary risk. Absence of these financial practices may lead to expansion of risky loans a phenomenon occurred in Mexico in the early 1990s. During this period, growth of credit was higher than deposits in the financial sector which allowed banks to use short-term funding from non-residents. These developments further contribute in bank exposure towards risk and lead to the currency crisis again in 1994 in Mexico (Ishii et al, 2002). This may also explain why welfare gains are mostly stagnant in the 1990s in Mexico. Based on this discussion, we may conclude that welfare gains were higher in Mexico when capital inflows were less volatile in the first two decades and lower in the subsequent two decades when capital flows become more volatile leading to capital flight and unsustainable debt levels.

180 A full description and analysis of the crisis is beyond the scope of this study. We are only relating the development of the crisis with the patterns of welfare gains in Mexico. (Edwards and Savastano, 1998) explain in detail the currency crisis of Mexico in 1994s and its consequences for the Mexican economy.

iii. Paraguay

As mentioned earlier, Paraguay is one LFI economy of Latin America which falls in the category of upper middle income country similar to Brazil and Mexico. While we have discussed the couple of cases of welfare gains from MFI group in Latin America, we will also describe a country case from the LFI group in this subsection. This will provide additional insight about the patterns of welfare gains across these two groups in the Latin America. One main reason for selecting this country case is that it is one of the economies of this region which experiences financial sector crisis following capital account liberalization (Ishii et al, 2002). It is also interesting to note that Paraguay is not a documented case of capital account liberalization in Henry (2007), however, Ishii et al (2002) choose this economy which has adopted various economic policies to liberalize its capital account regime.[181] Additionally, ratio of welfare gains in Paraguay exceeds the benchmark level since it experiences more than two times observed level of consumption relative to autarky in three out of the four cases. .

The structure of this landlocked Latin American economy is characterized by declining share of agricultural and industrial sectors with the corresponding rise of the services sector for the period 1960-1980 (Baer and Birch, 1987). The external and domestic financial liberalization process starts during the period 1989-1994 with the introduction of unified managed floating exchange rate in 1989. At about the same time, Paraguay pursues capital account liberalization policies allowing registered capital inflows relating to investment projects exemptions from various taxes and customs duties. As part of this process, the government also eliminates limits on the repatriation of private capital flows coming in the form of foreign direct investment as well as amortization of external debt. In addition, the condition of prior approval of the Central Bank for borrowing on the part of banks and finance companies was also abolished (Ishii et al, 2002).

Paraguay's annual average capital share in output is 0.49 which is higher than the standard benchmark of 0.3. The share of capital in income has declined over the years from 0.52 to 0.41. One possible reason for this decline in capital share in income is the increase in the price level of capital formation especially in the last decade. It has gone from 30% in 2002 to more than 70% in 2010.[182] Secondly, the economy was also hit by the financial sector crisis

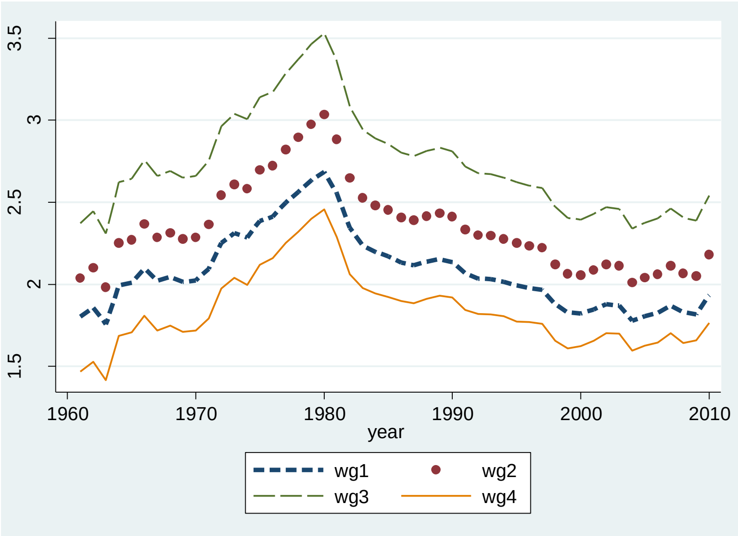
181 It is important to mention there is no simple rule which documents a country case in terms of capital account liberalization. While Ishii et al (2002) highlights country-specificeffects of a number of countries which experiences or averted financial crisis, Henry (2007) documents country cases of capital account liberalization based on published dates of stock market liberalization and establishment of country fund as the main indicators of capital account liberalization.

182 This figure is obtained from the PWT 8 which provides information about the price level of capital formation

during the period 1995-98 which may have contributed in the erosion of capital share in income. In addition, Paraguay's depreciation of the capital stock varies from 3.6% to 4.9% against the 6% depreciation rate used in the previous literature. As mentioned earlier, depreciation rate of capital is lower in less developed economies compared to advanced countries. These country-specific measures along with changes in output and capital stocks affect rates of return which are used to compute consumption under autarky.

We relate these changes in the economy of Paraguay with the patterns of welfare gains measured in the current study. Figure 40 describes the time series of welfare gains in Paraguay for all four cases.

Figure 40: welfare gains in Paraguay



wg1 indicates welfare gains for Case1. wg2 indicates welfare gains for Case 2.
wg3 indicates welfare gains for Case 3. wg4 indicates welfare gains for Case 4.

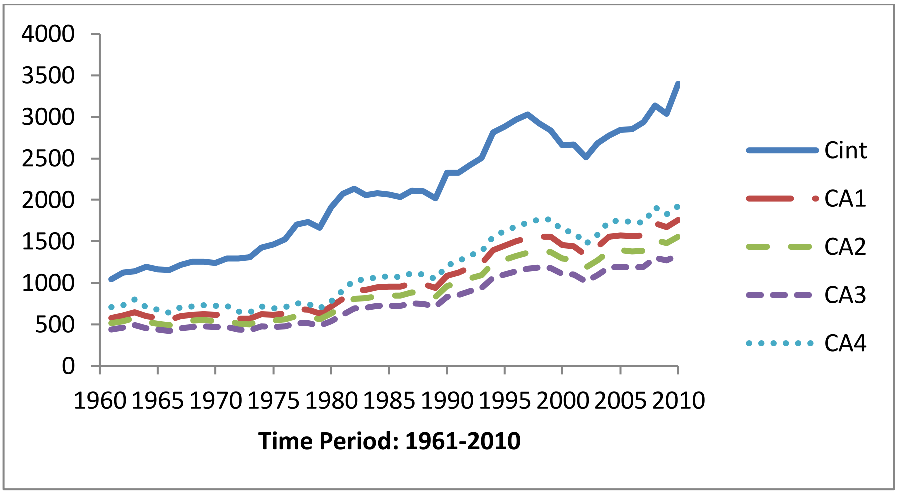
We again observe more or less similar trends across all four cases; however, the magnitude of gains is different over the years. The figure shows that welfare gains of international financial integration are higher in Case 3 relative to all other cases. In Case 3, we use estimated value of the time preference rate obtained through 2-SLS approach and remaining parameters specific to Paraguay economy to measure welfare gains for the period 1961-2010. Paraguay's time preference rate obtained by estimating equation (3.19) is 0.73 which is lower than the benchmark value of 0.96. As a result, the ratio of welfare gains in Paraguay rises from 2.08 in our baseline calculations in Case 1 to approximately 2.75 in Case 3.

Figure 40 also illustrates that welfare gains of financial integration are higher for the first two decades 1961-1981 relative to later period. The overall macroeconomic performance of Paraguay between 1961-1981was quite satisfactory. GDP growth rate during the decade of the 1960s averaged more than 4%. The trade sector expands during this period with the growth of imports in intermediate goods and fuels overtaking food products in earlier periods. National savings and investment rates exceed more than 12% of GDP (Baer and Birch, 1987). Higher growth rates coupled with higher saving and investment rates may have contributed towards higher welfare gains during the period 1961-1970.

We see continuing rise in growth rates in Paraguay in the 1970s. Average GDP growth rate was doubled from 4% to 8%. Agriculture and construction sector grew very rapidly. The former grows because of the expansion of the agricultural frontier because more land is brought under cultivation which contributes in exportable surplus in the economy. This exportable surplus also results from influx of farmers from Brazil and Japan who invested heavily in Paraguay agricultural sector which led to massive increase in the exports of cotton and soybeans in the period 1972-1979. The construction sector, on the other hand, receives boost due to public sector investment projects financed by substantial public capital inflows. Direct investments grow by almost 8 times from $ 3.2 million (US) to $32 million (US). The portfolio of long-term loans increases by more than 10 times from $15 million (US) to $160 million (US) and short-term capital also rises from $ 8 million (US) to $ 261 million (US) during the decade 1970-1980 (Baer and Birch, 1987). These factors are largely responsible for higher welfare ratio in the 1970s reflecting an increase in observed level of consumption by more than two times for most years relative to autarky.

In order to seek more insights about patterns of welfare gains, we plot actual and autarky path of consumption in Paraguay for the period 1961-2010. Figure 41 shows that actual consumption in Paraguay increases by more than three times from $ 1000 to around $ 3400 for the period 1960-2010. It is also visible from the figure that while actual consumption is increasing from 1961-1982, it falls in 1982 and remains almost constant during the whole decade of 1980s. One possible reason for the decline in actual consumption is the debt and currency crisis in Mexico which also have spill over effects in other developing Latin countries such as Paraguay (Lustig, 2000). In addition, Paraguay's productivity also witnessed a rising trends during the first two decades 1961-1981 as it grows from 52% compared with the base year in 2005 to 84%. It begins to decline in the year 1981 and continues to fall for the next two decades. We use Euler equation with technology growth (3.5) in order to compute consumption under autarky. It suggests that a country can enjoy the benefits of higher consumption at present without foregoing future consumption because of productivity growth. The fall in productivity in Paraguay may also have contributed in the decline of welfare gains in Paraguay during the period 1981-1990.

Figure 41: Actual and autarky paths of consumption in Paraguay



Cint = Actual consumption (Consumption under integration). CA1= Autarky consumption (Case 1).
CA2= Autarky consumption (Case 2). CA3= Autarky consumption (Case 3). CA4=Autarky consumption (Case 4).

We observe that actual consumption starts rising again from early 1990s in the wake of capital account liberalization in 1989, however, financial sector in Paraguay did not receive due attention. The expansion of the credit without financial sector reforms contributes in the growth of non-performing loans and results in capital deficiencies in majority of the banks of the country. Paraguay bears the brunt of major financial sector crisis in the year 1995 when government support to rescue the major banks fail to improve the payment system and leads to the closure or merger of major banks. During this crisis period, growth of credit to the private sector not only becomes sluggish but negative in the year 1998 when it contracts by 15% (Ishii et al, 2002). Actual consumption per capita also falls again from 1997 and continues to decline till 2002. This financial crisis which continues for the next 4-5 years affects economic performance and may have resulted in the declining trends of welfare gains in the late 1990s. The effect of the crisis is also reflected in the falling capital share which contracts by more than 20% in the immediate aftermath of the crisis. Based on this discussion, we may conclude that welfare gains in Paraguay are affected by country-specific conditions, structural transformation, foreign investment flows and productivity trends. Higher capital share coupled with higher productivity growth contribute in higher welfare gains in Paraguay in the first two decades in all four cases as compared to the last two decades.

iv. Summary

In this Latin American region, we find that one common characteristic observed in the time series of welfare gains is that the ratio of welfare gains is higher in earlier decades relative to subsequent years. This may suggest that welfare gains of international capital mobility are also realized across countries overtime prior to the liberalization of international capital flows.

Though financial liberalization has contributed in the expansion of bank credit to the private sector and private capital flows, it was accompanied with increasing risk of bad debts due to weak regulatory structures. This results in financial crisis in the region which leads to further debt accumulation and caused currency devaluations adversely affecting welfare gains in all three economies. We attempt to emphasize the significance of country-specific measures to explain time-varying welfare gains in these three economies. We observe more or less similar trends in all four cases, but the magnitude of welfare gains is different in all cases which reinforce our argument of country specificity in explaining welfare gains.

5.5 Concluding remarks

In the previous sections, we discuss welfare gains in five MFI economies of Asia, one MFI and two LFI economies in Africa and two MFI economies and one LFI economy in Latin America. We primarily focus on these selective country experiences in three regions which are documented cases of capital account liberalization policies to analyze their impact on welfare gains. Out of five MFI economies in Asia three economies namely India, Indonesia and South Korea are identified by Henry (2007) with specific years of capital account liberalization. In addition, we explain the patterns of welfare gain in China because it has been a big recipient of FDI net inflows as percentage of GDP. [183] We also discuss welfare analysis of Israel because it is one of the Asian economies with the higher welfare ratio of gains relative to other countries.

In Africa, we discuss welfare gains in one MFI economy and two LFI economies of Africa. South Africa is the only MFI economy in Africa which has been documented by Henry (2007) with specific date of capital account liberalization. Furthermore, we explain the patterns of welfare gain in two LFI economies which include Niger and Burkina Faso. These two economies are relatively more welfare enhancing in terms of higher observed level of consumption relative to autarky.[184] In Central, Latin America and Caribbean region, we focus

183 There are other big economies in the MFI group such as Hong Kong and Singapore which rank better in terms of financial integration. Hong Kong is the most open economy both by the *de facto* and *de jure measure* of financial openness and receives the highest FDI inflows as percentage of GDP. Singapore follows Hong Kong in this classification. However, these two economies are not documented cases of capital account liberalization (Henry 2000; Henry 2007). While there are reforms and liberalization policies adopted in various phases in these economies (Ariff and Khalid, 2005), in the previous sections, we focus on selective country experiences which are documented cases of capital account liberalization policies in order to analyze their impact on welfare gains. Henry (2007) documents cases of capital account liberalization by identifying dates of stock market liberalization and major economic reforms through a policy decree or country fund. Hong Kong and Singapore are considered recognized international financial centers and remains relatively more liberalized as compared to other Asian economies. Henry (2007) also explains the process of determining dates of stock market liberalization.

184 Henry (2007) has identified Nigeria and Zimbabwe from Africa with specific years of capital account liberalization. While Nigeria is part of the sample in the current study, Zimbabwe has not been classified as an MFI or LFI in Kose et al. (2006). We also mention about the rising value of gross stock in foreign assets and liabilities in Mauritius and briefly discuss about its welfare gains in the previous chapter. As it is not possible to explain each individual country, we focus on selective country cases. On the whole, financial integration generates annual average welfare gains in terms of observed level of consumption

on two MFI economies which include Brazil and Mexico. Henry (2007) documents both these economies as cases of capital account liberalization with specific years of reform. In addition, we discuss welfare gains in Paraguay which is not documented in Henry (2007) but finds its mention in Ishii et al (2002). Paraguay is the only economy in the region which experiences more than two times observed level of consumption relative to autarky in three out of four cases of welfare gains. [185]

Our approach of analyzing welfare gains in the light of domestic economic conditions and environment provides more insights about why some countries experience higher welfare gains and enjoy the benefits of higher consumption. We primarily focus on time preference rate, capital share in output, depreciation rate of capital, productivity growth and attempt to relate these country-based measures with actual growth experiences to understand the underlying factors affecting welfare gains. These elements of country specificity play an important role in explaining time series of welfare gains from international financial integration. To conclude, we may suggest that welfare gains have country-specific dimensions and require focus on country-specific measures for welfare comparisons within countries over time.

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which exceeds more than two times relative to autarky in 3 out of 16 LFI countries in Africa in case 1. In case 2, welfare gains in 9 economies increase by similar benchmark level while in case 3 this number goes up to 17. In case 4, Togo is the only country where observed level of consumption increases by more than 2 times relative to autarky but those gains are, however, lower than the baseline calculations of case 1. We also briefly discuss about Togo in Chapter 4.

185 In the LFI category of this region, no other country in case 1 and case 4 reports average annual ratio of welfare gains in excess of benchmark level of 2 which implies a two times observed level of consumption relative to autarky. In case 2 four countries and in case 3 five countries have been able to experience more than two times observed level of consumption relative to autarky. These economies in case 2 include Ecuador, Honduras, Jamaica, and Paraguay. Honduras, Jamaica, Panama, Paraguay and Uruguay are the five economies which reach this welfare benchmark estimate for case 3. One of the reasons for selecting Paraguay is that it has been identified as a country case which faced effects of Latin American financial crisis in the wake of capital account liberalization in Ishii et al (2002). Overall welfare gains are higher in the MFI economies as compared to the LFI economies in the region.

CHAPTER 6

RESULTS FOR SHORT AND LONG RUN GRANGER NON-CAUSALITY

6.1 Introduction

In chapter 3, we discuss in detail the empirical methodology employed to analyze the short-run and long-run relationships of welfare gains with trade variables of exports and imports. The empirical methodology outlines the steps of evaluating time series properties and testing for Granger non-causality within the VAR and VECM frameworks. We employ these approaches to examine the causal effects from trade variables to welfare gains using country based economic time series of a sample of 51 emerging and developing economies for the years1961-2010. This chapter provides a discussion of results for short-run and long-run causal effects of exports and imports on welfare gains.

We use data on welfare gains measured in Case 3 in the empirical analysis. As mentioned in previous chapters, we measure and construct time series of welfare gains under four cases. We consider this welfare measure more appropriate because it is based on extracted parameters from PWT 8 as well as estimated value of time preference rate β for each country in welfare calculations.[186] The data on export and import measures are obtained from the PWT 8 which provides information on share of merchandise exports and imports in output-side real GDP at current PPPs.

This chapter unfolds as follows: it begins with the discussion of univariate time series properties of the three variables used in empirical analysis. We test for stationarity by employing three unit root tests which include ADF, PP and additive outlier tests. Section 6.2 describes the results of these statistical tests in MFI and LFI economies. It is followed by co-integration test results which highlight possible co-integration relations between the variables. A growing body of empirical macroeconomics literature use co-integration technique as it allows to investigate both forms of covariation - short-run dynamics and long-run relationships of variables - through an error correction model (Greene, 2012). Section 6.3 explains the results of co-integration for the two groups. Based on the results of unit root and co-integration tests, we identify an appropriate VAR and VECM framework to evaluate short-run and long-run effects of trade on welfare gains. This requires testing for Granger non-causality in the short-run and long-run. Section 6.4 explains the results of long-run Granger non-causality. One of

186 As mentioned in the previous chapters, we observe more or less similar trend in all four cases of welfare gains but the size of welfare effects vary over time, perhaps because of the country-specificvalue of the patience parameter β .We incorporate the estimated value of this parameter in welfare calculations in order to find out how a country's respective consumption behavior explain patterns of welfare gains.

the key objectives of this study is to determine the direction of causality between exports, imports and welfare gains. This section also provides a detailed discussion on selected country cases of long-run Granger causality. Finally, we explain short-run Granger non-causality in countries where co-integration is not present. Section 6.5 evaluates the implications of trade on welfare gains for countries which do not show evidence of co-integration. Section 6.6 relates the results of current study with existing empirical evidence on causality. Section 6.7 summarizes and concludes the chapter.

6.2 Unit root results

We begin the analysis by plotting times series of welfare gains, exports and imports for the two groups of countries included in our sample. Appendices 20-25 show plots indicating the presence of trend characteristics as well as structural breaks for many countries which have to be considered in modelling the data generating process.[187] In order to formally analyze the implications of unit roots in welfare gains and trade variables, we perform three unit roots tests which include (ADF), (PP), and breakpoint unit root tests to determine the order of integration of economic time series. These tests are employed to consider the trending behaviour as well as structural breaks which may exist in the data. Appendices 26-27 report unit root results for the MFI and LFI economies.[188]

6.2.1 Results of unit root tests in MFIs

The results for three unit root tests conducted in the current study for MFIs are presented in Appendix 26. While the results obtained from ADF, PP and breakpoint unit root test are mostly consistent, we obtain different results for some countries. For example, welfare gains are I(1) based on ADF and PP tests, but break point unit root test classifies this time series as I(0). We, therefore, classify the order of integration of a time series based on additive outlier specification of breakpoint unit root test to avoid the effect of omitted breaks.[189] This test identifies the timing of the structural break which may exist in the data and accounts for it which otherwise tends to reject the null hypothesis of a unit root in a particular series. The results of breakpoint unit root tests show that welfare gains are non-stationary for 19 countries out of a sample of 22

187 Given the plots of the three time series, we identify structural breaks through the application of the breakpoint unit root test. In estimating the time preference rate (β) in Chapter 4, we identify the breaks through the plots and include dummies in the 2 SLS approach. Therefore, we did not apply the breakpoint unit root test to identify the breaks in estimating the time preference rate (β). The breakpoint unit root test, however, identifies the timing of a break in terms of a specific year.

188 We perform these unit root tests using the statistical package of Eviews 9.

189 The standard unit root tests which include ADF and PP have weak power. These testing procedures do not account for omitted breaks which may exist in the data. We, therefore, classify the order of integration based on breakpoint unit tests. Moreover, these results based on breakpoint unit roots also ensure robustness in most cases.

MFI countries. Countries with non-stationary welfare gains at 1% and 5% level of significance include Argentina, Brazil, Chile, Columbia, Egypt, Hong Kong, India, Indonesia, Israel, Korea, Malaysia, Morocco, Peru, Philippines, Singapore, South Africa, Thailand, Turkey and Venezuela. We test for unit root in first differences following non-rejection of unit root hypothesis at levels for this set of countries using additive outlier specification of breakpoint unit root test. These results indicate that time series of welfare gains which is non-stationary for 19 countries become stationary in first differences. We report the results for unit root in first differences for all three tests in Appendix 26. Countries with stationary welfare gains at levels include China, Mexico and Pakistan. It indicates that the sample mean, variance and covariance properties for the time series of welfare gains of these three countries are similar across different sample periods.[190]

The results of breakpoint unit root test for time series of exports used in this study show that this variable is non-stationary for 18 out of 22 MFI economies. We do not reject the null hypothesis of non-stationarity for these countries based on breakpoint unit root results which are mostly consistent with respective ADF and PP results. We then test for unit root in first differences. The absence of unit root after differencing indicates that exports are $\sim$ I(1). Countries with stationary time series of exports at levels include Argentina, Columbia, Morocco, and Peru.

The breakpoint unit root results for time series of imports indicate non-stationarity of this variable at levels using trend and constant specifications for 16 out of the 22 economies. The presence of unit root for imports at levels in this set of countries takes us to conduct unit root in first differences. The results reported in Appendix 26 show that imports $\sim$ I(1) for 16 countries. Times series of imports for the remaining 6 economies follows properties of stationarity at levels. These 6 economies include Chile, China, Peru, South Africa, Turkey and Venezuela.

6.2.2 Results of unit root test in LFIs

LFIs countries comprise a group of 29 economies. Similar to the MFI analysis, we determine the order of integration of a particular time series in the light of breakpoint unit root results to deal with the effects of potential structural breaks which may exist in the data. It is important to account for structural breaks in the deterministic part in order to conduct effective unit root test as omitted breaks may result in the non-rejection of the null hypothesis of the unit root. Appendix 27 provides details of results of three unit root tests carried out for LFIs. The results

190 A stationary variable I(0) is included in level form in the estimations.

of breakpoint unit root suggest that out of the sample of 29 countries, welfare gains for 22 economies are non-stationary in the log of levels. The non-rejection of unit root hypothesis of non-stationarity for these economies at levels requires a test of unit root in first differences. Countries with welfare gains non-stationary at 5% levels of significance include Benin, Bolivia, Botswana, Burkina Faso, Cameroon, Costa Rica, Côte d’Ivoire, Dominic Republic, Ecuador, El Salvador, Gabon, Guatemala, Honduras, Jamaica, Kenya, Mauritius, Niger, Paraguay, Senegal, Sri Lanka, Togo and Tunisia. The results in first differences show that welfare gains are stationary as we reject hypothesis of non-stationary at 5% level of significance. In the LFI category, though the breakpoint unit root test results are different from ADF and PP results for some countries but overall the results of the three unit root tests remain mostly consistent. Countries with stationary welfare gains include Bangladesh, Burundi, Ghana, Nigeria, Panama, Syria and Uruguay. We report the results of all three unit root tests in Appendix 27.

We perform similar testing procedure for exports. The breakpoint unit root results suggest that exports in the log of levels are not stationary for 19 out of the 29 economies used in our sample. In order to proceed further with the requirement of empirical estimation that requires underlying time series should be stationary, we test for unit root in first difference and find that exports are $\sim$ I(1). The results of remaining 10 countries show that exports are stationary in the log of levels. These 10 countries include Cameroon, Cote d Ivoire, Dominic Republic, Gabon, Panama, Senegal, Syria, Togo, Tunisia, and Uruguay.

Finally, we test for unit root for time series of imports in LFI economies. There exists a unit root in the log of level of imports for 23 economies. For these countries, the results of breakpoint unit root tests show failure of test statistic to fall in the rejection region which leads to non-rejection of null hypothesis of a unit root in the log of levels of imports. Next, we test for the unit root in first differences. The absence of unit root after differencing implies that time series of imports $\sim$ I(1) for 23 LFI economies. Countries with stationary series of imports in the log of levels include Benin, Burundi, Costa Rica, Dominic Republic, Panama and Togo. As mentioned, we classify the order of integration based on additive outlier specification of breakpoint unit root tests. These findings are supported by the respective ADF and PP results for most countries. The breakpoint unit root results along with ADF and PP results for LFI economies are reported in Appendix 27.

6.3 Co-integration

Standard econometric models do not apply to most macroeconomic time series which are characterized as non-stationary. In order to explore the co-integration relations which may be present in a system of variables, we test for co-integration. Given the nature of the time series behaviour of variables based on unit roots test results, we classify four scenarios which take the following form:

1. All three variables are $\sim$ I(1)
2. Two variables are $\sim$ (1) and one is I(0)
3. One variable is $\sim$ I(1) and two are I(0)
4. All three variables are I (0).

Though co-integration exists in the first two scenarios, we test for co-integration for all four scenarios to ensure consistency between unit roots and co-integration results. For example, if there is a variable stationary I(0) in a system then co-integration result should show at least one co-integrating vector. The absence of a co-integrating vector in case of a stationary variable in the VECM framework indicates either unit root or co-integration results are incorrect (Rahmatsyah et al, 2002). The results of the co-integration test for a trivariate VECM specification which includes welfare gains, exports and imports are summarized in appendices 28-29. We also incorporate appropriate structural breaks in this trivariate VECM identified through breakpoint unit root tests.

6.3.1 Co-integration results for MFIs

We provide details of the co-integration tests in MFI economies based on Johansen-Juselius framework in Appendix 28. It reports the results for trace test (LR_{trace}) and maximum eigenvalue test (LR_{max}) for MFI countries to establish the number of co-integrating vectors. We also report the optimal lag length justified by Akaiki information criterion (AIC) and Swartz Criteria (SC). [191] The results of trace test and maximum eigenvalue test show that null hypothesis of no co-integrating vector is rejected for 9 MFI economies out of a sample of 22 economies. Out of these 9 economies, the results indicate one co-integrating relationship for 6 economies and two co-integrating relationships for three economies. Countries with one co-integrating vector include Brazil, Egypt, India, Israel, Malaysia and Korea while Indonesia, Singapore and Thailand each have two co-integration relations. We test for long run Granger non-casuality within the VECM framework in countries where co-integration relations are present. In the VECM specification, we consider all variables in the system as endogenous.

191 In the empirical analysis, we employ optimal lag length p determined by AIC.

When there are short-run deviations in the system, adjustments are made because all variables interact with each other to converge back to long-run equilibrium.

It is important to point out different cases which emerge from the estimation of the VECM equation (3.26) based on the above-mentioned four scenarios. The Granger representation theorem illustrates how co-integration is established through VAR and provides the basis for the selection of an adequate and appropriate model. If all three time series in this estimated model are stationary, co-integration rank $r = K$. This implies that the process is stationary and original VAR specified in equation (3.26) in levels is considered. This can be considered as one of the boundary cases which do not represent a co-integrated system. Based on the univariate time series properties of the variable, we did not identify any case of this nature within MFI economies.

On the other hand, when $r = 0$, then the appropriate model is a VAR $(p - 1)$ in first differences. It implies that if all variables $\sim$ (1) and $r = 0$, there exists a stable VAR representation in first differences. In MFI economies, we identify two such empirical scenarios which include Hong Kong and Philippines. This is another boundary case which does not qualify to be a co-integrated system in the sense that it possesses a common trend.

The results of co-integration tests in MFI economies based on Johansen-Juselius framework in Appendix 28 suggest cases in which empirical model has a co-integrating rank which is strictly between 0 and K but no co-integration relation is present in the original sense. For example, the breakpoint unit root results in Appendix 26 show that in Argentina, two variables namely welfare gains and imports are $\sim$ (1) but exports are I(0). The co-integration test results in Appendix 28 shows the presence of one co-integrating rank in the system. This indicates that exports which is I(0) forms a trivial co-integrating vector and co-integration is not present in the original sense. A trivial co-integrating vector results from each stationary variable in the system which appears in the column of the co-integrating matrix (β) with a unit in one position and zeros elsewhere. While it does not represent a co-integrating relation, it is important to consider such cases in order to ensure consistency between unit roots and co-integration results. As mentioned in the empirical methodology, in other cases, co-integration requires that the matrix (π) has a reduced rank $0 < r < k$. Table 20 lists countries based on the four scenarios of time series properties in Appendix 26 and co-integration results in Appendix 28.

Table 20: Classification of countries based on Unit roots and Co-integration results (MFIs)

	Specification of time series	Co-integrated systems	Not co-integrated systems
1	All variables are ∼ I(1)	Brazil, Egypt, India, Indonesia, Israel, Korea, Malaysia, Singapore, Thailand	Hong Kong, Philippines
2	Two variables are ∼ I(1) and one is I(0)		Argentina, Chile, Columbia, Mexico, Morocco, Pakistan, South Africa, Turkey Venezuela
3	One variable is ∼ I(1) and two are I(0)	-	China, Peru
4	All variables are I(0)	-	None

It shows that co-integration is present in 9 MFI economies and all variables are classified as ∼ I(1). We investigate the short-run and long-run effects of trade on welfare gains in the framework of the VECM for 9 MFI countries. If all variables are I(1) but not co-integrated we consider that a stable VAR representation exists in first differences. In addition, we specify an appropriate VAR process for the remaining countries based on univariate time series properties of the variables for analyzing short-run relationship among the variables.

6.3.2 Co-integration results for LFIs

Appendix 29 provide results for trace test (LR_{trace}) and maximum eigenvalue test (LR_{max}) in LFI countries. The results based on Johansen-Juselius framework show that null hypothesis of no co-integrating vector is rejected for 6 LFI economies out of a sample of 29 countries. These six countries include Bolivia, Botswana, El Salvador, Guatemala, Paraguay, and Sri Lanka.

The results of Appendix 29 suggest cases similar to MFI economies which indicate that no co-integration is present in the original sense despite the presence of a co-integrating rank among the variables. Panama is the only country in the LFI category in which all variables are I(0) and $r = K$ as all stationary variables form trivial co-integration vectors. Similarly, countries with two I(1) and one I(0) variables in the system have one trivial co-integrating vector and those with two I(0) and one I(1) variables have two trivial co-integrating vectors. Table 21 lists countries based on the four scenarios of time series properties in Appendix 27 and co-integration results for LFI economies in Appendix 29.

Table 21: Classification of countries based on Unit roots and Co-integration results (LFIs)

	Specification of time series	Co-integrated systems	Not co-integrated systems
1	All variables are $\sim$ I(1)	Bolivia, Botswana, El Salvador, Guetamala, Paraguay, Sri Lanka	Burkina Faso, Ecuador, Hondurus, Jamiaca, Kenya, Mauritius, Niger
2	Two variables are $\sim$ I(1) and one is I(0)		Bangladesh, Benin, Cameroon, Costa Rica, Côte d'Ivoire, Gabon, Ghana, Nigeria, Senegal, Tunisia
3	One variable is $\sim$ I(1) and two are I(0)		Burundi, Dominic Republic, Syria, Togo, Uruguay
4	All variables are I(0)		Panama

It shows shows that co-integration is present in 6 LFI economies for which there is at least one co-integrating vector. All variables for these countries are classified as $\sim$ I(1). In addition, we find that 10 countries have a combination in which two variables are $\sim$ I(1) and one is I(0) and 6 countries have a combination in which one variable is $\sim$ I(1) and two are I(0). For these two scenarios, the co-integration test results described in Appendix 29 demonstrate the presence of as many trivial co-integrating vectors as the number of stationary variables. This exercise ensures consistency in the unit root and co-integration test results and allows for the specification of an appropriate model for investigating the short-run and long-run relationship of welfare gains and trade variables.

6.4 Testing Granger causality between welfare gains and trade in co-integrated systems

6.4.1 Results for MFIs in co-integrated systems

The current study aims to examine the causal relationships between trade and welfare gains to investigate the question of how trade variables of exports and imports affect welfare gains in the short-run and long-run. Table 22 summarizes the short-run and long-run casual effects of exports and imports on welfare gains in co-integrated systems within MFI countries. It reports joint (F-statistics) of the error correction term and lagged differenced variables within the VECM framework to determine overall Granger non-causality. The long-run causal relationships are established by the significance of respective co-integrating vectors (β) and error correction terms. It requires that both the likelihood ratio test statistics with χ^2

distribution and error correction terms should be statistically significant. The short-run causal relationships are determined through the joint test (F-statistics) for lagged differenced variables.

The results in Table 22 indicate that there is long-run equilibrium relationship among exports, imports and welfare gains in 5 out of the 9 MFI economies in co-integrated systems. One of the key findings of long-run results is that welfare gains are import led in 4 out of 5 MFI economies. These four economies which include Indonesia, Israel, South Korea and Thailand experience positive impact of imports on welfare gains. The empirical evidence of import led welfare gains in MFI economies shows that domestic consumers benefit more relative to producers because trade allows imports and causes domestic prices to fall in the importing country. It also supports the conventional argument that consumer gains are generally higher relative to the losses of producers in the economy. On the other hand, India is the only MFI case of export led welfare gains in co-integrated systems. The evidence of export led welfare gains in India suggests that domestic prices increase leading to higher producer gains relative to consumers. The economy as a whole benefits from trade because overall gains of both exports and imports are higher relative to losses incurred in both the scenarios.

Our time series analysis indicates interesting findings in individual countries regarding the relationships between welfare gains, exports and imports. Countries experiencing import led welfare gains also show negative relationship of exports to welfare gains. However, it is interesting to note that these countries exhibit trading patterns which reflect overall current account surplus in their economies. Indonesia, Korea, and Thailand enjoy overall current account surplus as exports exceed imports for the period under consideration. [192] On the other hand, India's import and export figures show current account deficit despite indicating export driven welfare gains. Israel represents a case of import led welfare gains with overall trade deficit. These findings may require further explanation of the channels which contribute to the import led or export led welfare gains. We broadly discuss these two key findings about MFI economies in the next section.

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192 The overall trade balance is determined from the exports and imports figures obtained from PWT for the period 1961-2010.

Table 22: Granger causality structure of welfare gains (WG), exports (X) and imports (M) in co-integrated systems (MFIs)

		$X \rightarrow WG$	$WG \rightarrow X$	$M \rightarrow WG$	$WG \rightarrow M$	$M \rightarrow X$	$X \rightarrow M$
Brazil	Overall	None	Yes	None	Yes	Yes	Yes
	F-statistics	**0.40**	**10.14*** **	**0.13**	**10.93** **	**7.08*** **	**10.05*** **
	Long run	None	Positive	None	Positive	Negative	Negative
	LR Test	**2.67**	**28.60** **	**12.93*** **	**22.29*** **	**29.92*** **	**28.09*** **
	ECM	**-0.01**	**-0.19*** **	**-0.01**	**-0.52*** **	**-0.19*** **	**-0.52*** **
	Short run	None	Positive	None	None	None	Positive
	F-statistics	**0.46**	**3.77** **	**0.20**	**1.21**	**0.50**	**3.30** **
Egypt	Overall	None	Yes	None	Yes	Yes	Yes
	F-statistics	**1.04**	**5.29*** **	**1.26**	**5.23*** **	**4.01** **	**2.46***
	Long run	None	Negative	None	Positive	Positive	Positive
	LR Test	**-7.05** **	**10.06*** **	**2.71**	**11.56*** **	**13.20*** **	**16.48*** **
	ECM	**-0.07**	**-0.53*** **	**-0.07**	**0.05**	**-0.53** **	**0.05**
	Short run	None	Positive	None	Positive	Negative	Positive
	F-statistics	**1.27**	**4.85** **	**1.10**	**7.42** **	**2.59***	**3.38** **
India	Overall	Yes	Yes	Yes	None	Yes	None
	F-statistics	**5.31*** **	**2.56***	**3.55** **	**1.81**	**1.79**	**2.22***
	Long run	Positive	Positive	Negative	None	Positive	None
	LR Test	30.70***	18.26***	17.77***	21.22***	9.92***	15.66***
	ECM	-0.35***	-0.40**	-0.35***	-0.09*	-0.40**	-0.09*
	Short run	Negative	Negative	None	None	None	None
	F-statistics	**3.92** **	**2.58***	**1.46**	**1.79**	**0.59**	**0.87**
Indonesia	Overall	Yes	Yes	Yes	Yes	None	Yes
	F-statistics	**16.93*** **	**4.45*** **	**16.62*** **	**14.98*** **	1.60	**14.03*** **
	Long run	Negative	Negative	Positive	Positive	None	Positive
	LR Test	**56.26*** **	**35.34*** **	**51.58*** **	**34.30*** **	47.47***	**36.70*** **
	ECM 1	**0.14*** **	**0.13***	**0.14*** **	**-0.82*** **	0.13*	**-0.82*** **
	ECM 2	**0.02*** **	**0.89***	**0.12*** **	**0.44*** **	0.89*	**0.44** **
	Short run	Positive	Positive	None	Positive	None	Negative
	F-statistics	**3.61** **	**4.99** **	**1.17**	**4.04** **	1.96	**3.62** **

Note: *, **, and *** denote 10%, 5% and 1% levels of significance. The joint F-(Statistic) of the error correction term and lagged difference variables within the VECM framework determines overall Granger causality. The significance of the likelihood ratio test statistics and error correction term determines the long run Granger causality for countries with one co-integrating vector. The significance of the likelihood ratio test statistics and one of the error correction terms determines the long run Granger causality for countries with two co-integrating vectors. The joint F-(Statistic) of lagged difference variables determines short run Granger causality.

Table 22 (Continued): Granger causality structure of welfare gains (WG), exports (X) and imports (M) in co-integrated systems (MFIs)

		$X \rightarrow WG$	$WG \rightarrow X$	$M \rightarrow WG$	$WG \rightarrow M$	$M \rightarrow X$	$X \rightarrow M$
Israel	Overall	Yes	None	Yes	Yes	None	None
	F-statistics	**5.89*** **	**1.48**	**10.18*** **	**11.80*** **	**0.78**	**0.69**
	Long run	Negative	None	Positive	None	None	None
	LR Test	**21.74*** **	**3.86**	**20.10*** **	**5.06***	**21.16*** **	**17.51*** **
	ECM	**0.12*** **	**-0.25**	**0.12*** **	**0.31**	**-0.25**	**0.31**
	Short run	None	None	Positive	Positive	None	None
	F-statistics	**1.94**	**2.17**	**7.11*** **	**9.64*** **	**1.14**	**0.94**
Korea	Overall	Yes	None	Yes	Yes	Yes	Yes
	F-statistics	**11.20*** **	**0.81**	**15.67*** **	**19.97*** **	**2.68***	**8.15*** **
	Long run	Negative	None	Positive	Positive	None	Positive
	LR Test	**19.89*** **	**2.31**	**18.19*** **	**9.05** **	**28.58*** **	**19.64*** **
	ECM	**0.05*** **	**-0.10**	**0.05*** **	**-0.52*** **	**-0.10**	**0.52*** **
	Short run	Positive	None	Negative	Positive	Negative	None
	F-statistics	**1.55**	**0.01**	**3.95***	**10.07*** **	**5.32** **	**0.42**
Malaysia	Overall	None	Yes	Yes	Yes	Yes	Yes
	F-statistics	0.34	**12.70*** **	**3.98** **	**14.38*** **	**12.00*** **	**4.88** **
	Long run	None	Positive	None	Negative	Positive	Positive
	LR Test	**9.25*** **	**13.97*** **	**3.75**	**7.67** **	**10.28*** **	**7.91** **
	ECM	**-0.02**	**-0.52*** **	**-0.02**	**0.21*** **	**-0.52*** **	**0.21*** **
	Short run	None	Positive	Negative	Positive	Negative	Positive
	F-statistics	**0.13**	**5.62** **	**5.10** **	**25.52*** **	**9.01*** **	**3.34***
Singapore	Overall	None	Yes	Yes	Yes	None	Yes
	F-statistics	**2.48***	**2.58** **	**2.83** **	**5.03** **	**0.63**	**1.24**
	Long run	None	None	None	Positive	None	Positive
	LR Test	**34.96*** **	**27.63*** **	**35.65*** **	**27.90*** **	**23.39*** **	**22.91*** **
	ECM 1	**-0.19**	**0.03**	**-0.19**	**-1.40** **	**0.03**	**-1.40** **
	ECM 2	**0.09**	**0.32**	**0.09**	**1.92** **	**0.32**	**1.92** **
	Short run	None	Positive	Negative	Positive	None	Negative
	F-statistics	**0.40**	**3.34** **	**2.28***	**2.91** **	**0.77**	**1.19**

Note: *, **, and *** denote 10%, 5% and 1% levels of significance. The joint F-(Statistic) of the error correction term and lagged difference variables within the VECM framework determines overall Granger causality. The significance of the likelihood ratio test statistics and error correction term determines the long run Granger causality for countries with one co-integrating vector. The significance of the likelihood ratio test statistics and one of the error correction terms determines the long run Granger causality for countries with two co-integrating vectors. The joint F-(Statistic) of lagged difference variables determines short run Granger causality.

Table 22 (Continued): Granger causality structure of welfare gains (WG), exports (X) and imports (M) in co-integrated systems (MFIs)

		$X \rightarrow WG$	$WG \rightarrow X$	$M \rightarrow WG$	$WG \rightarrow M$	$M \rightarrow X$	$X \rightarrow M$
Thailand	Overall	Yes	Yes	Yes	Yes	Yes	Yes
	F-statistics	**2.23***	3.43**	**3.04****	**15.95*****	2.56*	**7.86*****
	Long run	Negative	Negative	Positive	Positive	Positive	Positive
	LR Test	**28.79****	**23.96*****	**29.48*****	**35.22*****	**29.32*****	**23.06**
	ECM 1	**-0.14****	**0.08**	**-0.14****	-0.75***	**0.08**	-0.75***
	ECM 2	**0.009**	**0.84*****	**0.009**	**1.10*****	**0.84*****	**1.10*****
	Short run	None	None	None	Positive	None	Negative
	F-statistics	**0.91**	**1.73**	**1.86**	**14.16*****	**1.04**	**3.61***

Note: *, **, and *** denote 10%, 5% and 1% levels of significance. The joint F-(Statistic) of the error correction term and lagged difference variables within the VECM framework determines overall Granger causality. The significance of the likelihood ratio test statistics and error correction term determines the long run Granger causality for countries with one co-integrating vector. The significance of the likelihood ratio test statistics and one of the error correction terms determines the long run Granger causality for countries with two co-integrating vectors. The joint F-(Statistic) of lagged difference variables determines short run Granger causality.

6.4.2 What drives welfare gains in MFI economies: imports or exports?

Based on the review of literature which primarily suggests that trade contributes in economic growth and welfare gains of a country, we expect a positive relationship from exports and imports to welfare gains. The results in Table 22 support this hypothesis that there are import led welfare gains in 4 out of the 5 MFI economies which have significant casual effects in the long-run. While most of these economies enjoy current account surplus, imports constitute an important channel which contributes in welfare gains. The mechanism at work is that trade allows domestic prices to become equal to the world prices leading to an increase in the domestic demand. This increase in domestic demand benefits consumers of the goods being imported relative to the producers. At the same time, we find negative and significant relationship of exports to welfare gains for this group of countries. This implies an increase in producer welfare relative to consumer because producers export the goods whose prices go up to equal the world price. The overall welfare, however, may depend on the relative strength of the import and export effects. The estimation results of MFI countries also indicate that the coefficient of imports is greater than the coefficient of exports in countries which show positive relationship of imports to welfare gains (Appendix 30). Hence, we may argue that the import effect dominates in countries enjoying positive long-run relationship in contrast to the export effect leading to the overall gains.

Our results also point out the close connection between global capital markets and goods markets integration which is important to achieve net transfer of capital to realize welfare gains in developing countries. Ford and Horioka (2017) also note that the objective of net capital transfer across countries cannot be achieved by liberalizing the capital markets in isolation. Goods markets also play an important role in achieving this objective of net transfer of capital. Moreover, Horioka and Ford (2018) highlight that there exist frictions in global goods markets such as transport, marketing, distribution costs, technical standards, and tariffs and non-tariffs barriers. They also indicate a correlation between the levels of savings and investment across countries. This phenomenon requires global integration of capital markets as well as goods markets to achieve reallocation of capital from low return locations to higher return countries. Given this argument, the current study measures welfare gains from international financial integration in a sample of emerging and developing economies and subsequently empirically examine how these gains are affected by trade variables of exports and imports.

To elaborate further, we look at export and import patterns of MFI economies which show significant long-run relationships in Table 23 and draw on their experiences to explain the role of trade in welfare gains. As mentioned in previous chapters, welfare gains have a country-specific dimension. The elements of country specificity may also play a role in explaining the welfare effects of trade in an economy. Table 23 shows the exports and imports as percentage of GDP based on ten-year average for five MFI economies which exhibit significant causal effects from exports and imports to welfare gains in the long-run.

Table 23: Exports and imports as percentage of output-side real GDP at current PPPs in MFIs

	Exports (% of GDP)					**Imports (% of GDP)**				
	1961-1970	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2010**	**1961-1970**	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2010**
India	1.84	2.02	2.77	3.45	4.94	2.87	2.28	3.96	3.93	7.33
Indonesia	24.94	23.96	12.07	12.11	17.58	5.09	6.46	8.06	8.32	12.41
Israel	14.38	18.07	21.10	25.26	36.01	25.24	30.16	29.84	35.27	41.12
South Korea	3.22	16.18	24.73	24.06	33.43	10.42	20.22	24.24	23.16	29.94
Thailand	7.58	8.15	10.99	20.89	32.37	13.19	12.32	14.12	23.44	32.45

Source: PWT 8. Time period 1961-2010

From the trends in Table 23, we find that there are fluctuations in exports and imports in all five MFI economies for the period 1961-2010. Overall these trade statistics show that both exports and imports have increased as percentage of GDP. The share of exports relative to imports in national income has increased in Indonesia, Korea and Thailand. Korea experiences the largest increase in its export share. It goes up by more than 10 times between 1961-2010. At the same time, its share of imports in GDP goes up by almost three times. Table

23 also reflects trade deficits in case of India and Israel.[193] While there is an upward trend for exports, the share of imports in GDP is fluctuating in these economies. We also observe upward trend for exports for the economy of Thailand during this period. This perhaps suggests that both exports and imports are likely to lead to higher welfare gains, however, the overall effect depends on the relative significance and strength of the import and export effects.

The results in Table 22 also suggest that there is a bi-directional causality between imports and welfare gains for Indonesia, Korea and Thailand. India, on the other hand, is the only MFI economy which shows bi-directional causality between exports and welfare gains. This shows the existence of virtuous cycle between imports and welfare gains for Indonesia, Korea, and Thailand and exports and welfare gains for India. However, our results indicate no long run Granger causality from exports and imports to welfare gains in Brazil, Egypt, Malaysia and Singapore. In these countries trade variables and welfare gains may not be driven by a common stochastic trend which allows them to move together to some extent in the long run. [194]

In order to further evaluate the impact of changes in exports and imports on welfare implications, we also report investment and consumption statistics as percentage of GDP for the same group of MFI economies which show significant Granger causal relations. Table 24 provides details of investment and consumption as percentage of GDP in these five economies. These figures reveal that a sizeable increase in investment to GDP ratio may lead to a significant reduction in consumption as percentage of GDP. On the other hand, a marginal increase in investment may not result in a substantial decline in consumption. This phenomenon appears to be dominant in case of South Korea which experiences significant increase in investment to GDP ratio from 1971-1980 accompanied by substantial reduction in consumption. This perhaps also suggests the relative significance of import and export effects in explaining overall welfare gains in an economy. If a rise in investment demand is catered through rise in imports, then the import effect may dominate the export effect leading to higher welfare gains.

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193 Both India and Israel are oil importing economies. India is ranked 3rd and Israel is ranked 30th in 2014 in terms of imports of crude oil. We obtain this information from the World Factbook available on: https://www.cia.gov/library/publications/the-world-factbook/rankorder/2243rank.html

194 There may be additional macro and micro level factors which can link the time paths of trade variables with welfare gains or explain why there is no long run relationship in these countries. The current study only examines the causal path between trade variables and welfare gains.

Table 24: Investment and consumption as percentage of output-side real GDP at current PPPs in MFIs

	Investment (% of GDP)					Consumption (% of GDP)				
	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010
India	17.66	17.88	17.68	18.15	26.98	75.79	69.97	69.65	63.90	54.78
Indonesia	5.89	13.46	19.06	19.17	21.93	64.00	55.17	55.62	55.48	63.65
Israel	29.19	27.22	21.12	31.35	22.06	50.04	40.94	48.03	51.25	56.72
South Korea	20.07	30.10	32.50	34.78	32.44	70.01	59.34	52.75	52.35	51.09
Thailand	21.79	23.28	19.90	35.62	26.22	66.20	61.28	53.91	43.26	52.02

Source: PWT 8.0. Time period 1961-2010

We can also observe from the figures in Table 23 that while Korea experiences investment boom in the 1960s and 1970s, India experiences more or less similar pick up in investment in the last decade from 2001-2010. In the following we focus on country cases of South Korea and India to seek more insights and intuition regarding the results of the current study. It is instructive to analyze Korea and India because the former represents a case of of import led and the lattercharacterizes a case of export led welfare gains.

i. South Korea

We focus on the case of South Korea which has transformed itself from a poor country in 1960 into a successful growth and welfare story over the last five decades. In 1961, South Korea's per capita income was around 1600 US dollars. It goes up by more than 17 times to 28000 US dollars in the year 2010. [195] We find in our welfare calculations that the ratio of welfare gains in South Korea increases from 1.37 in 1961 to 2.15 in 2010 (Appendix 12). Moreover, South Korea consistently experiences more than two times increase in the actual level of consumption relative to autarky from 1986-2010.[196] In order to seek a more plausible explanation of the role of imports and exports in welfare gains, we review and relate key economic statistics of the South Korean economy in tables 23-24 with the empirical evidence obtained in the current study.

From the results in Table 22, it is clear that South Korean economy shows a positive impact of imports on welfare gains and negative effect of exports on welfare gains. We look at the exports, imports, investment and consumption trends provided in tables 23-24 to establish which of these effects may dominate and review the main economic policies pursued by South Korea during this period. To start with, South Korea has a comparative disadvantage in the production of capital goods in the 1960s. At about the same time, it experiences an investment

195 Authors calculations based on PWT data 8 which provides information about consumption share of economies in out-side real GDP at current PPPs.

196 South Korea's ratio of welfare gains exceeds 2 since 1986 which implies a two times increase in the observed or actual level of consumption relative to autarky (Appendix 12).

boom in the first two decades which is indicated by the rise in investment as percentage of from 1961-1980. This investment boom causes imports to grow in the economy as part of the investment demand is met through imports of capital goods (Rodrik, 1995). Moreover, this is also accompanied by the growth of exports to foot the increasing import bill. The rise in investment leads to an improvement in overall trade orientation resulting in expansion of both exports and imports in the Korean economy. This point is noted in detail in Rodrik (1995) who argues that the direction of causality between exports and growth becomes negative in South Korea if investment demand is properly accounted for. This argument places more emphasis on investment induced imports in improving the standards of livings of the people in Korea.

To elaborate further, we connect this import channel of trade with increasing welfare gains in the current study and show that this import effect may dominate the export effect in Korea. The estimation results also indicate that the size of the import coefficient in VECM framework is larger relative to the coefficient of export. We report the results of the estimated coefficients of the VECM of MFI countries in co-integrated systems in Appendix 30. Our evidence of dominant import effect relative to exports in welfare gains is broadly consistent with Rodrik's (1995) explanation in which he highlights the close relationship between investment demand and imports in South Korea. The investment to GDP ratios in Table 24 also show that the investment boom continues in South Korea for nearly two decades 1961-1980 in a sustained manner and remains relatively stable in the following decades. One main reason for this investment boom is the increase in imports of capital goods constituting machinery and transport equipment. Machinery and transport equipment constitutes around 2% of total imports in South Korea in 1961. It goes up to more than 12% of total imports by 1985.[197] Table 24 indicates that consumption patterns remain relatively stable during the three decades 1980-2010 at about 51% of national income.

The preceding analysis suggests import bias growth relative to exports in South Korea. It perhaps provides a plausible explanation of dominating positive welfare effect of imports in this economy. We observe this import biased growth phenomena which results from investment boom during the period 1961-1980. The consequent increase in capital stocks overtime shifts economy's production possibility frontier outward more in the direction of imports relative to exports. Trade theory suggests that import biased growth improves a growing economy's terms of trade relative to the rest of the world and enhances its welfare.[198] Our results are supported

197 Rodrik (1995) obtains these figures from Economic Planning Board, Major statistics of the Korean Economy 1976, 1989.
198 Rodrik (1995) formally illustrates this thinking in general equilibrium terms for Korea.

by this argument and suggest that imports contribute in welfare through consumption gains in the importing country. Based on this analysis, we may suggest that welfare gains positively respond to imports relative to exports in South Korea. This discussion explains the role of channels contributing to the enhancement of welfare gainsdue to increased imports in the South Korean economy. Imports (of capital goods) lead to higher investment which increases exports and then output (GDP) and hence higher consumption. Otherwise, increased imports will only lead to higher current account deficit without corresponding increase in income, which many developing countries suffer.

ii. India

Our times series results demonstrate that India is the only MFI economy which represents a unique case of export led welfare gains. The results in Table 22 show that exports positively affect welfare gains in India in the long-run. Interestingly and somewhat counter-intuitively, the results also suggest a negative impact of imports on welfare gains. This finding is in sharp contrast to most conventional accounts which indicates that imports contribute in higher consumption gains in a growing economy. However, the overall impact of trade variables of exports and imports on welfare gains will be positive because trade contributes in economic welfare through both these channels. It is also interesting to note that India which was regarded as a highly closed economy in the early years after independence in 1947 turns out to be a net importing country by the year 2010.[199] We may, therefore, demonstrate caution in interpreting this empirical evidence and try to carefully characterize appropriate factors which may contribute in export led welfare gains in India.

In order to analyze trade effects on welfare gains and further elaborate the results obtained in the current study, we also review key economic statistics of the Indian economy. India’s economic growth rate until about 1980 also termed as the “Hindu rate of growth” was quite disappointing. [200] In per capita terms, it grows at an annual rate of 1.3% during the period 1960-1980. Since 1980, it grows by more than three times at an annual rate of 4% per year (Panagariya, 2005). At about the same time, we find from trends in Table 23 that both exports and imports increase by more than 2.5 times over the last five decades. Additionally, the volume of both exports and imports is higher in the last two decades relative to early years

199 Based on the overall figures of exports and imports obtained from PWT 8, India is a net importing country where imports exceed exports for the period 1961-2010. We also observe that imports as a percentage of GDP remain higher than exports. However, magnitude of both exports and imports shows that India was a minor player in world trade due to slower economic growth in the first three decades (Rodrik and Subramanian, 2005).
200 “Hindu” rate of growth is used by many growth economists to explain slow growth in India for the first three decades of its existence. It is 1 percentage point higher than population growth (Krugman et al, 2012).

suggesting an increasing degree of trade integration in the Indian economy. On the other hand, Table 24 indicates relatively modest levels of investment in India for the first four decades before it begins to grow rapidly from 2001-2010. We also note from Table 24 that consumption as percentage of GDP is relatively stable for nearly three decades from 1961-1990 before it declines in the last two decades. The fall in consumption may be the result of rise in investment and imports in India following liberalization in the 1990s.

We further drill down the data in Tables 23-24, in an attempt to seek a more plausible explanation of export led welfare gains in India in the long run. We find modest growth in investment relative to imports as percentage of national income for the period 1961-2010. At about the same time, we observe that actual consumption is also falling, but relative to autarky consumption it is increasing as is indicated in the growing ratio of welfare gains. Our welfare calculations show that the ratio of welfare gains in India increases from 1.5 in 1961 to 1.9 in 2010 indicating higher level of actual consumption relative to autarky (Appendix 12). A possible mechanism could be that higher level of exports benefit producers relative to consumers in the short-run. This is indicated by the negative sign of short-run Granger causality in Table 22 which implies a fall in welfare gains due to rise in exports. These producers may have used their earnings in further consumption instead of investment. We observe relatively modest levels of investments in India for nearly four decades from 1961-2000 which perhaps support this contention. This argument is supported by the growing middle class and decline in public sector savings in India. Public sector savings which remain at 3.7% of national income from 1970-1984 fall to 0.6% of national income by the year 1994-1995 (Panagariya, 2005). This can be interpreted as a relative rise in consumption contributing in higher welfare gains over time in the long-run.

Moreover, India starts to attract more investment to encourage growth in the economy in the wake of introduction of financial sector reforms, less reliance on state owned enterprises and more privatisation in the 1990s. These reforms contribute in higher exports indicated in Table 23 in the last two decades 1990-2010. Higher exports lead to higher income. But given higher return on investment people prefer to sacrifice their current consumption for future income and (higher consumption). The increase in income in future also affects people's preferences which may contribute in higher consumption. These channels suggest that people start consuming more due to higher income, luxuries gradually become necessities over the long-run.

We may conjecture that a rise in the relative income of the producers would generate an income effect.[201] This income effect would in turn induce more consumption of the goods being produced in India. On the other hand, substitution effect induces more consumption of the imported goods and less of domestic goods. If the income effect tends to outweigh the substitution effect, then the overall welfare gains due to higher exports will increase in India.[202] This argument is supported by both consistent increases in per capita income and welfare gains since 1980. In addition, India's exports and imports grow at an annual average rate of 7.2% and 7.9% respectively between 1961-2010 while its consumption per capita grows at the rate of around 2% per year. [203] High growth in imports occurs in the last decade in the wake of liberalization in 1990s. During this period imports grow at an annual average rate of more than 15% per year.[204] However, average effective rate of protection on imports of consumer goods remains higher relative to capital goods in India. [205] This also indicates a relatively higher degree of protection in the 1990s despite liberalization which may depress the import effect relative to export effect in India. These channels explain the rationale of export led welfare gains in India in contrast to import led welfare gains.

6.4.3 What determines reverse causality?

The results in Table 22 show no evidence of the presence of import or export led welfare gains in four MFI economies. These four economies include Brazil, Egypt, Malaysia and Singapore. On the other hand, the results tend to suggest the existence of reverse causality in these economies. It implies that causality runs from welfare gains to either exports or imports and welfare gains are likely to affect exports or imports in the economies. The results suggest that welfare gains positively affect imports in Brazil, Egypt and Singapore. Malaysia is the only country which shows negative impact of welfare gains on imports. We also find positive and significant causal effect from welfare gains to exports in Brazil and Malaysia. However, in case of Egypt welfare gains show a negative impact on exports.

201 As producers also act as consumers, it is not the income of producer but increase in income in general which increases the demand for goods and services providing an incentive to businesses to invest and expand production. At the same time, the quality of products and easing to trade, exchange rate stability leads to higher import of raw material and capital goods and more demand for exports.

202 We can also relate it with Rodrik (1995) framework. However, in such a situation there will export biased growth instead of import biased growth. It assumes external terms of trade as fixed.

203 Authors calculations based on PWT data 8.

204 Authors calculations based on PWT data 8.

205 According to Rodrik and Subramanian (2005) effective rate of protection on capital goods remains consistently lower than consumer goods for the period 1980-2000. They obtain this data on effective rate of protection from Das (2003). During the 1990s effective rate of protection on capital goods was 70% which comes down to 44% in the next decade. On the other hand, effective rate of protection on consumer goods was more than 100% in the 1990s which falls to 65% in the next decade.

The positive impact of welfare gains on exports and imports indicate the higher actual consumption relative to autarky contributes in higher level of exports and imports in the country. As discussed earlier, the average annual ratio of welfare gains in Brazil exceeds 2 which implies more than two times increase in actual consumption relative to autarky consumption (Figure 35). This ratio remains higher than 2 for almost the entire period which may have contributed to higher level of imports in Brazil. It is also interesting to note Brazil is a net importing country.[206] Malaysia, on the other hand, shows positive impact of welfare gains on exports and negative impact of welfare gains on imports. Malaysia is a net exporting economy. [207] In this specific case higher actual consumption relative to autarky contributes in higher exports in the country. Malaysia's per capita income increases by more than 4% and consumption at around 3% per year for the period 1961-2010. [208] It appears quite plausible that consumption related factors may also drive exports and imports in an economy.

Caution is, however, appropriate in interpreting these results. Harrison and Rodríguez-Clare (2009) review many studies which highlight the problem of reverse causality in detail.[209] The evidence of negative impact of welfare gains on imports in Malaysia may suggest dominant role of domestic investment relative to imports in driving exports and economic welfare in Malaysia (Lim, 1987; and Rock, 2002). Malaysia used FDI as a means to boost domestic manufacturing sector. Another plausible reason could be capital flight which occurs in Malaysia during the Asian financial crisis in 1997-1998 which led to imposition of capital controls in Malaysia (Ariff and Khalid, 2005). Egypt, on the other hand, is a net importing country which may have resulted in positive impact of welfare gains on imports. Again, the overall impact depends on the relative welfare effects on exports or imports. In case of Malaysia, welfare gains may have contributed more in exports relative to imports while in Egypt welfare gains may have contributed more in imports relative to exports.

6.4.4 Long-run causality between exports and imports

The results in Table 22 also show significant casual effects within trade variables of exports and imports. There is a positive association of imports and exports in four MFI economies which include Egypt, India, Malaysia and Thailand. On the other hand, countries experiencing

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206 Based on the overall figures of exports and imports obtained from PWT 8, Brazil is a net importing country where imports exceed exports for the period 1961-2010. Egypt and Singapore are also net importing economies.

207 Based on the overall figures of exports and imports obtained from PWT 8, Malaysia is a net exporting country where exports exceed imports for the period 1961-2010.

208 Authors calculations based on PWT 8.

209 Harrison and Rodríguez-Clare (2009) mention range of issues which include geography, shifts in terms of trade, exchange rate shocks, changes in transportation and communication costs as well as trade policies which may affect the patterns of trade and affect the nature of association of causal relations.

positive impact from exports to imports include Egypt, Indonesia, Korea, Malaysia, and Thailand.[210] The long-run casual path between exports and imports is bi-directional in Egypt, Malaysia and Thailand. [211]

While there is a vast research about the role of exports and imports in economic growth and development, there is a dearth of studies which focus on the role of exports on imports and vice versa. We may relate our results with trade openness and liberalization of developing economies in the 1980s and 1990s. This liberalization plays an important role in the economic transformation of many Asian economies (Rodrik, 1995, Ariff and Khalid, 2005; and Harrison and Rodríguez-Clare, 2009). Encouraging imports and expansion of exports both form part of the openness and liberalization policies, however, strategies which account for domestic economic conditions and characteristics may also determine the impact of exports on imports or imports on exports. For example, we find a positive causal relationship between exports and imports in Korea. This may be due to the various policies of the Korean government Korean which focussed on heavy investment and accumulation of foreign equipment from other countries in the form of imports which contribute in productivity growth and development of new technologies. This policy of capital accumulation contributes in the export boom which Korea experienced subsequently in the late 1980s and 1990s (East Asia Mircale, Rodrik 1995). It appears from the Korean experience that the role of the government is also very critical in stimulating exports and imports for the benefits of the domestic economy.

On the contrary, Brazil is the only MFI economy which indicates negative impact of both exports and imports on each other in the long-run. This evidence should be interpreted with caution because there may be other macroeconomic variables which affect the association of trade channels of exports and imports. We do not find evidence of significant casual effects between exports and imports in Israel.

6.4.5 Results for LFIs in co-integrated systems

We summarize the results of short- run and long- run casual effects of exports and imports on welfare gains in co-integrated systems within LFI countries in Table 25. The results suggest that welfare gains are import led in 2 LFI economies in co-integrated systems. These two countries include El Salvador and Sri Lanka which experience positive impact of imports on

210 We are reporting the case of Singapore in this list. It also shows positive long run impact from exports to imports, but our overall F-statistic value indicates that this evidence should be interpreted with caution.
211 Results about causality in trade variables in Singapore also require caution. While we do not establish overall causality in Singapore, we do find evidence of positive long run causality from exports to welfare gains. This perhaps suggests inclusion of additional macroeconomic variables in explaining association of trade variables which are beyond the scope of this research. We are interested in testing causality from trade to welfare gains.

welfare gains. It reports joint (F-statistics) of the error correction term and lagged differenced variables, likelihood ratio test statistics with χ^2 distribution along with significance of error correction term, and joint test (F-statistics) for lagged differenced variables.

Similar to MFI economies, the empirical evidence of import led welfare gains in LFI economies supports the conventional argument that consumer benefits more as compared to producers when a country allows imports through trade. We observe that LFI countries which show positive impact of imports on welfare gains also experience negative effects of exports on welfare gains. We do not find evidence of short run impact of trade variables on welfare gains in El Salvador and Sri Lanka. On the other hand, Botswana is the only LFI case of export led welfare gains in co-integrated systems.[212] This evidence suggests higher producer gains relative to consumers. While overall welfare gains increase in both the scenarios, it is the relative dominance of either the import effect or the export effect which determines welfare implications of trade. We do not find evidence of long run Granger causality from exports and imports to welfare gains in three LFI economies which include Bolivia, Guatemala and Paraguay.

We further relate the empirical evidence of long run relationships in LFI economies with their respective trading patterns and positions. In this group, countries experiencing import led welfare gains are net importing economies. On the other hand, Botswana which is case of export led welfare gains is a net exporting economy.[213] Sri Lanka and El Salvador are classified as lower middle income countries while Botswana falls in the category of upper middle economies.[214] We begin the discussion by examining ten year average of exports and imports for three LFI economies which show significant Granger causal relations in the long run in Table 26.

212 Over the last decade, 2000-2010, remittances in Botswana also increase manifold. These remittances which were negligible in the early years increase to more than 80 million US dollars in the year 2005. We obtain this information from the Global economy https://www.theglobaleconomy.com/Botswana/Remittances/ which is based on information collected from the World Bank.

213 The overall trade balance is determined from the exports and imports figures obtained from PWT for the period 1961-2010.

214 We obtain information on country classification from World Bank source https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

Table 25: Granger causality structure of welfare gains (WG), exports (X) and imports (M) in co-integrated systems (LFIs)

		$X \rightarrow WG$	$WG \rightarrow X$	$M \rightarrow WG$	$WG \rightarrow M$	$M \rightarrow X$	$X \rightarrow M$
Bolivia	Overall	None	None	Yes	Yes	None	Yes
	F-statistics	**1.48**	**1.35**	**3.55****	**18.27*****	**0.44**	**12.68*****
	Long run	None	None	None	Positive	None	Positive
	LR Test	**4.68***	**4.93***	**28.46*****	**37.71*****	**25.44*****	**42.24*****
	ECM	**0.13**	**0.009**	**0.13**	**-0.79*****	**0.009**	**-0.79*****
	Short run	None	None	Negative	Positive	None	Positive
	F-statistics	**0.93**	**1.54**	**3.49****	**6.42*****	**0.30**	**1.36**
Botswana	Overall	Yes	Yes	Yes	None		None
	F-statistics	**10.80*****	**2.67***	**11.33****	**0.79**	**4.08*****	**1.46**
	Long run	Positive	Positive	Negative	None	Positive	None
	LR Test	**47.07*****	**13.66*****	**45.74*****	**3.10**	**31.79*****	**30.43*****
	ECM	**-0.18*****	**-0.40****	**-0.18*****	**0.15**	**-0.40****	**0.15**
	Short run	Negative	None	Positive	None	Negative	None
	F-statistics	**3.89****	**0.83**	**5.57*****	**0.76**	**3.41****	**1.89**
El Salvador	Overall	Yes	None	Yes	None	None	None
	F-statistics	**94.56*****	**1.59**	**94.56*****	**0.23**	**1.59**	**0.23**
	Long run	Negative	None	Positive	None	None	None
	LR Test	53.76***	43.44***	54.00***	37.99***	1.93	0.36
	ECM	-1.06***	0.01	-1.06***	-0.001	0.01	-0.001
	Short run	-	-	-	-	-	-
	F-statistics	-	-	-	-	-	-
Guatemala	Overall	None	Yes	None	Yes	Yes	None
	F-statistics	**1.59**	**5.64*****	**0.68**	**5.32*****	**5.33*****	**2.56***
	Long run	None	Positive	None	Negative	Positive	None
	LR Test	**11.92*****	**15.20*****	**14.69*****	**11.83*****	**15.62*****	**13.40*****
	ECM	**-0.05**	**-0.65*****	**-0.05**	**0.02***	**-0.65*****	**0.02***
	Short run	None	None	None	Positive	None	None
	F-statistics	**1.60**	**0.34**	**0.91**	**5.57*****	**2.42**	**2.92**

Note: *, **, and *** denote 10%, 5% and 1% levels of significance. The joint F-(Statistic) of the error correction term and lagged difference variables within the VECM framework determines overall Granger causality. The significance of the likelihood ratio test statistics and error correction term determines the long run Granger causality for countries with one co-integrating vector. The significance of the likelihood ratio test statistics and one of the error correction terms determines the long run Granger causality for countries with two co-integrating vectors. The joint F-(Statistic) of lagged difference variables determines short run Granger causality.

Table 25 (Continued): Granger causality structure of welfare gains (WG), exports (X) and imports (M) in co-integrated systems (LFIs)

		$X \rightarrow WG$	$WG \rightarrow X$	$M \rightarrow WG$	$WG \rightarrow M$	$M \rightarrow X$	$X \rightarrow M$
Paraguay	Overall	None	Yes	None	Yes	Yes	Yes
	F-statistics	0.73	13.17***	0.73	**17.72*** **	**13.17*** **	**17.72*** **
	Long run	None	Positive	None	Positive	Negative	Negative
	LR Test	**1.29**	**12.04*** **	**7.39*** **	**7.10** **	**16.01*** **	**19.29*** **
	ECM	**-0.03**	**-0.18*** **	**-0.03**	**-0.26*** **	**-0.18*** **	**-0.26*** **
	Short run	-	-	-	-	-	-
	F-statistics	-	-	-	-	-	-
Sri Lanka	Overall	Yes	None	Yes	Yes	None	Yes
	F-statistics	**8.22*** **	**3.00** *	**8.22*** **	**4.08** **	**3.00** *	**4.08** **
	Long run	Negative	None	Positive	Positive	None	Positive
	LR Test	**31.25*** **	**8.74** **	**28.41*** **	**5.97** *	**29.81*** **	**23.02*** **
	ECM	**-0.05** **	**-0.21** *	**-0.05** **	**-0.42** **	**-0.21**	**-0.42** **
	Short run	-	-	-	-	-	-
	F-statistics	-	-	-	-	-	-

Note: *, **, and *** denote 10%, 5% and 1% levels of significance. The joint F-(Statistic) of the error correction term and lagged difference variables within the VECM framework determines overall Granger causality. The significance of the likelihood ratio test statistics and error correction term determines the long run Granger causality for countries with one co-integrating vector. The significance of the likelihood ratio test statistics and one of the error correction terms determines the long run Granger causality for countries with two co-integrating vectors. The joint F-(Statistic) of lagged difference variables determines short run Granger causality.

The trends in Table 26 indicate that both exports and imports expand enormously in Botswana during the first two decades of 1961-1980. During the period 1971-1980 exports grow to 52% of GDP and imports increase to almost 70% of GDP. The downward trend starts in subsequent years, but we observe that exports remain higher than imports in the latter period. El Salvador and Sri Lanka, on the other hand, show higher level of imports over exports throughout the period 1961-2010 making them net importers.

Table 26: Exports and imports as percentage of output-side real GDP at current PPPs in LFIs

	Exports (% of GDP)					**Imports (% of GDP)**				
	1961-1970	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2010**	**1961-1970**	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2010**
Botswana	24.36	52.12	51.16	32.48	28.22	40.60	69.81	45.71	26.27	27.51
El Salvador	23.90	24.66	25.38	49.47	41.26	29.24	34.68	35.82	80.15	66.18
Sri Lanka	6.24	5.96	8.01	10.93	12.66	6.61	7.17	10.93	12.37	18.36

Source: PWT 8. Time Period 1961-2010

In order to examine welfare effects, we also evaluate the investment and consumption profiles of three LFI economies. Table 27 shows investment and consumption as percentage of GDP in these economies. We argue that a rise in either investment or consumption may contribute in higher welfare gains. Trade variables of exports and imports contribute to the enhancement ofboth consumption and investment. We observe from the trends in Table 27 that investment as percentage of GDP is higher in the 1970s relative to other decades in Botswana. El Salvador and Sri Lanka show higher levels of investment in the last decade from 2001-2010. Both these LFI economies confronted civil wars.[215] Below we describe a country case of Botswana considered as an African success story. It is instructive to take account of this LFI African economy because it represents a case of export led welfare gains contrary to conventional accounts of imports induced welfare.

Table 27: Investment and consumption as percentage of output-side real GDP at current PPPs in LFIs

	Investment (% of GDP)					**Consumption (% of GDP)**				
	1961-1970	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2010**	**1961-1970**	**1971-1980**	**1981-1990**	**1991-2000**	**2001-2010**
Botswana	23.21	43.46	19.23	23.84	37.74	76.56	52.06	43.46	49.91	35.11
El Salvador	8.92	12.19	9.10	14.64	26.60	81.66	79.87	76.59	95.27	97.37
Sri Lanka	8.49	14.02	19.88	17.32	23.58	68.31	67.77	56.90	61.33	67.41

Source: PWT 8. Time period 1961-2010

i. Botswana:

Botswana is considered as an African success story and enjoys the highest growth rate of per capita income in the world for 35 years from 1965-2000 (Rodrik, 2003). We find that in the year 1960 its PPP adjusted per capita income was less $ 500 US. It crosses $ 9000 US by the year 2010 indicating an average annual increase of 6.5%.[216] Botswana average annual ratio of welfare gains is 1.88 indicating higher level of actual consumption relative to autarky (Appendix 16). At about the same time, we observe that its actual level of consumption exceeds by more than two times relative to autarky consumption for many years (Appendix 21). The results in Table 25 suggest that exports contribute positively in enhancing welfare gains in Botswana. In order seek more insight about this empirical finding, we review key economic statistics and policies pursued by Botswana over the period 1961-2010.

There are number of factors which explain why exports are welfare enhancing relative to imports in Botswana. There is no doubt that Botswana is a diamond rich economy and this natural resource plays a pivotal role in economic growth of the country. In contrast to other African economies which are also rich in diamond such as Angola and Congo, Botswana was able to utilize the revenues generated from this resource in an efficient and optimal manner through sound economic policies (Acemoglu et al, 2002). The revenues from diamond were

215 In El Salvador civil war started in 1980 and ended in 1992. In Sri Lanka it started in 1983 and ended in 2009.

216 This is based on the calculations based on data from PWT 8.

utilized to stimulate investments in the manufacturing sector by the government as it enjoys budgetary surplus for many years (Jafferis, 1998). The policy of utilizing diamond revenues for building domestic manufacturing sector is also illustrated by investment profiles provided in Table 27. Investment has been around 40% of GDP for two decades from 1961-1980 while for remaining decades it remains steady at 20% of GDP. This coupled with the balance of payment surplus and large accumulated reserves prevents the government from approaching international financial institutions (IFIs) for structural adjustment facility (Lieth, 2000). Acemoglu et al. (2002) also highlight that the exports of diamond only may not have transformed Botswana from a lower income economy to upper middle income country, if the revenues generated from this resource are not properly utilized. They reinforce that this economic success is mainly driven by sound economic policies which ensures the optimal utilization of exports receipts in a socially optimal manner. [217]

We may conjecture that exports of mineral resources such as diamond contribute in enhancing relative income of the people in Botswana. It generates an income effect which induces people to consume more goods and services produced within the economy. At about the same time substitution effect acts to make the economy consume more of imported goods and services. Our conjecture is that the income effect dominates the substitution effect and consumption of goods produced within the economy increases. In Botswana, we also observe positive long-run bi-directional causality between exports and welfare gains which suggests the existence of a virtuous cycle between these variables. However, this evidence of virtuous cycle is not present between imports and welfare gains.

6.5 Testing Granger causality between welfare gains and trade in non- cointegrated systems

In the previous section, we discuss the results of Granger non-causality in co-integrated systems of MFI and LFI economies. We obtain these results in the framework of VECM which explains long run Granger non-causality as well as short run Granger non-causality. In this section, we explain the results between welfare gains and trade variables of exports and imports in systems which are not co-integrated. In such cases, we test for Granger non-causality through an appropriate VAR specification as described in the empirical framework. It may be referred

217 Acemoglu et al (2002) specially mention about the government's deal with the diamond trading company De Beers under which resource rents were invested in Botswana rather than wasting it. Many African countries such as Angola and Congo are also endowed with this resource but various interest groups fight for the control of these resource rents. These countries also confront civil wars, however, sound economic policies on the part of the government of Botswana ensure that these resource rents are invested on public goods such as infrastructure, health and education.

to as “Short run Granger-non causality”. Based on the time series properties of variables employed in this study, we discuss the results of short run Granger non-causality in stationary VAR processes as follows:

6.5.1 Results for Short run Granger non-causality in MFI economies

We report the classification of countries based on unit root and co-integration test results for MFI economies in Table 20. It shows that out of 22 MFI economies, co-integration is not present in 13 economies. We test for short run Granger non-causality in these 13 countries in the framework of a stationary VAR process. Table 28 reports F-statistics of pairwise Granger non-causality test for the short run.

The results suggest there is a short run causal relation from imports to welfare gains in 3 MFI economies at 1%, 5% and 10% levels of significance. These three economies include Argentina, Hong Kong and Mexico. In all these economies imports show negative impact on welfare gains. On the other hand, 9 MFI economies show positive short run Granger causality and one country indicates negative causality from welfare gains to imports. Countries with positive short run causality from welfare gains to imports include Argentina, Hong Kong, Mexico, Morocco, Peru, Philippines, South Africa, Turkey and Venezuela. Pakistan is the only country which shows negative short run causality from welfare gains to imports. One possible reason for the negative short run causality could be higher import prices despite higher demand for imported goods in Pakistan. [218]

Caution is, however, appropriate in interpreting these results. MFI economies in Latin America such as Argentina and Mexico which show a negative impact of imports on welfare gains also indicate a positive effect in the reverse direction from welfare gains to imports. Some studies from previous literature explain this phenomenon of negative impact of imports on growth by relating it with different initial productivity levels of economies (Rivera-Batiz and Romer 1991). Trade between two countries may not benefit both economies equally as long as productivity growth varies across economies. For example, if the reform is introduced in the home country by liberalizing trade tariffs, it may attract imports without corresponding increase in consumption growth and welfare owing to lower initial productivity levels. Devereux and Lapham (1994) also show that countries which are initially poor may not be able to benefit from rising imports through openness because policies of reform produce growth impact with the passage of time.

218 Pakistan has been a net importing country for the entire period except in year 1973. However, the data from PWT 8 shows that price level of imports is relatively higher that price level of exports for most of the years.

Table 28: Pairwise Granger Causality tests (F-statistics and Granger causality structure of welfare gains, exports and imports) for MFIs

	$Ex \rightarrow WG$	Sign	$WG \rightarrow Ex$	Sign	$M \rightarrow WG$	Sign	$WG \rightarrow M$	Sign	$M \rightarrow X$	Sign	$X \rightarrow M$	Sign	Lags
Argentina	0.84	-	1.01	+	6.80***	-	6.23***	+	0.50	-	0.87	-	3 lags
Chile	0.03	-	0.90	-	0.29	+	1.26	+	0.44	+	0.39	-	1 lags
China	0.77	-	1.20	-	0.95	+	0.21	+	1.60	+	0.41	-	4 lags
Columbia	0.39	+	0.11	+	0.20	-	12.12	+	0.42	-	0.48	+	1 lag
Hong Kong	5.29**	-	1.99	+	3.60*	-	10.18***	+	0.06	-	0.35	+	1 lag
Mexico	3.33**	+	0.26	-	2.21*	-	10.30***	+	2.74**	+	2.16*	-	4 lags
Morocco	0.12	+	0.48	+	0.94	+	3.86**	+	2.64*	-	0.12	+	2 lags
Pakistan	1.82	-	0.94	+	0.13	-	4.00***	-	2.01	-	0.81	+	4 lags
Peru	8.44***	+	0.80	+	1.88	-	8.05***	+	1.87	+	1.88	+	4 lags
Philippines	0.02	+	1.01	+	2.58	-	12.31***	+	0.007	-	0.01	+	1 lag
South Africa	0.09	+	0.83	+	0.67	-	5.08**	+	0.89	-	0.05	-	1 lags
Turkey	3.06**	+	1.45	-	0.40	+	4.03**	+	1.43	+	0.44	+	3 lags
Venezuela	0.36	+	0.35	-	1.97	-	15.87***	+	1.47	-	3.12*	+	2 lags

Note: *, **, and * denote 10%, 5% and 1% levels of significance. Optimal lag length is determined using Akaike information criterion (AIC).**

On the other hand, the empirical result of reverse positive causality may, however, find support from a previous study which shows that private consumption spending in many countries of Latin America including Argentina and Mexico increases manifold which contribute in the consumption boom witnessed in these economies especially in the 1980s and 1990s (Calvo et al, 1996). This consumption boom generates higher demand for imported goods in these economies and results in positive short-run Granger causality from welfare gains to imports. However, higher prices of imports may have contributed in reduction of consumption leading to the negative short-run causality from imports to welfare gains. Argentina and Mexico also fall in the category of post 1980 globalisers – group of countries which experience doubling of trade share in GDP of the economy and its associated benefits in terms of growth and welfare (Dollar and Kraay, 2004).[219]

The results in Table 28 also indicate that exports Granger cause welfare gains in 4 MFI economies at 1%, 5% and 10% levels of significance. These four economies include Hong Kong, Mexico, Peru and Turkey. The sign of short run causality in Hong Kong shows that exports negatively affect welfare gains. Mexico, Peru and Turkey, however, show positive sign of short run causality from exports to welfare gains. Hong Kong is a net exporting economy while Mexico, Peru and Turkey are net importing economies. In the latter case, income effect generated by exports may dominate relative to substitution effect of imported goods leading to higher welfare gains. We do not find any evidence of short run casual relations from welfare gains to exports in MFI economies. Appendix 32 reports results for VAR estimates for MFI countries.

6.5.2 Results for Short-run Granger non-causality in LFI economies

Table 21 classifies LFI countries based on unit root and co-integration test results. Out of 29 LFI economies, we do not find any evidence of existence of co-integration in 23 economies. It implies that trade variables may not have common stochastic trends that allow them to move together in the long run in LFI economies. We test for short run Granger non-causality in these 23 countries in the framework of a stationary VAR process. Table 29 reports F-statistics of pairwise Granger non-causality test for the short run in LFI economies.

We observe positive short run causality from imports to welfare gains for Mauritius and Syria while 2 LFI economies namely Honduras and Panama have negative impact of imports

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219 David and Kraay defines Globalisers in terms of their growth in trade relative to GDP between 1975–79 and 1995–97 of a group of 72 developing. Globalisers reduce average import tariffs by 22% while non Globalisers reduce it by 11%.

on welfare gains. Similar to the MFIs case, the results reveal that welfare gains drive imports in more LFI economies. There is a positive short run impact of welfare gains to imports for Costa Rica, Dominic Republic, Ecuador, Gabon, Honduras, Jamaica, Kenya and Niger at 1%, 5% and 10% levels of significance. On the other hand, 3 LFI economies which include Cameroon, Niger and Uruguay show negative impact of welfare gains to imports. We may attribute the positive impact to higher demand of imports in majority of LFI economies which have relatively higher purchasing power to purchase the imported goods.

The results in Table 29 further suggest that exports positively affect welfare gains in 4 LFI economies which include Bangladesh, Ecuador, Niger and Senegal at 1%, 5% and 10% levels of significance. Nigeria and Tunisia, on the other hand, show negative impact of exports to welfare gains. We also observe bi-directional causality from exports to welfare gains and welfare gains to exports for Bangladesh and Niger. Appendix 33 reports results for VAR estimates for LFI countries.

Table 29: Pairwise Granger Causality tests (F-statistics and Granger causality structure of welfare gains, exports and imports) for LFIs

Country	$Ex \rightarrow WG$	Sign	$WG \rightarrow Ex$	Sign	$M \rightarrow WG$	Sign	$WG \rightarrow M$	Sign	$M \rightarrow X$	Sign	$X \rightarrow M$	Sign	Lags
Bangladesh	2.90**	+	18.66***	+	0.37	+	2.10	-	1.24	+	1.86	+	4 lags
Benin	1.35	+	1.88	+	0.48	-	1.09	+	1.31	-	2.95*	+	2 lags
Burkina Faso	0.04	+	4.25**	+	1.01	-	2.01	+	0.22	+	0.42	-	2 lags
Burundi	0.01	+	0.51	-	0.05	-	0.71	-	0.04	+	0.21	+	1 lags
Cameroon	0.21	-	0.11	-	1.66	+	2.32*	-	0.53	+	1.75	+	4 lags
Costa Rica	0.60	+	1.53	+	0.90	-	9.53***	+	2.96*	-	0.13	-	2 lags
Côte d'Ivoire	0.86	+	2.25*	+	0.50	-	2.06	+	0.96	-	1.01	+	4 lags
Dominican Republic	0.26	+	0.14	+	2.07	-	6.67**	+	10.13***	+	3.63*	+	1 lags
Ecuador	7.63***	+	0.05	-	1.56	-	34.09***	+	0.91	-	3.55*	-	1 lag
Gabon	0.13	+	1.64	-	1.91	-	7.18***	+	0.31	+	1.27	-	2 lags
Ghana	1.32	+	0.29	-	0.77	-	1.72	-	0.77	-	2.82*	+	3 lags
Honduras	0.11	+	2.52	+	4.61**	-	27.40***	+	1.69	+	0.63	-	1 lag
Jamaica	0.67	-	2.61*	+	1.45	-	4.32***	+	1.01	-	3.42**	+	2 lags
Kenya	0.33	+	0.27	+	1.55	-	4.91**	+	3.29*	-	3.11*	+	1 lag
Mauritius	1.11	-	1.44	+	3.91**	+	1.15	+	3.13**	+	1.21	-	4 lags
Niger	2.54*	+	2.63*	+	0.60	+	5.56***	+	0.06	-	2.64*	+	2 lags
Nigeria	2.91**	-	0.34	-	0.11	+	2.93**	-	2.47*	+	0.64	-	4 lags
Panama	0.16	+	1.09	-	3.17**	-	1.19	-	1.62	+	5.10***	+	4 lags

Note: *, **, and * denote 10%, 5% and 1% levels of significance. Optimal lag length is determined using Akaike information criterion (AIC).**

Table 29 (Continued): Pairwise Granger Causality tests (F-statistics and Granger causality structure of welfare gains, exports and imports) for LFIs

Country	$Ex \rightarrow WG$	Sign	$WG \rightarrow Ex$	Sign	$M \rightarrow WG$	Sign	$WG \rightarrow M$	Sign	$M \rightarrow X$	Sign	$X \rightarrow M$	Sign	Lags
Senegal	6.71***	+	2.02	+	1.41	+	0.25	-	0.32	-	0.59	-	2 lags
Syria	0.07	-	0.27	-	11.39***	+	1.26	-	0.59	-	1.51	-	1 lags
Togo	0.002	-	0.71	+	0.01	+	2.43	+	3.94**	+	0.80	+	2 lags
Tunisia	2.66*	-	1.34	+	2.08	-	1.39	+	0.54	-	0.14	+	2 lags
Uruguay	0.15	+	2.64*	-	0.30	-	9.13***	-	0.82	+	0.80	+	2 lags

Note: *, **, and * denote 10%, 5% and 1% levels of significance. Optimal lag length is determined using Akaike information criterion (AIC).**

6.6 What is the direction of causality between trade, growth and welfare?

In the previous sections, we describe the results of long-run and short-run Granger causality between exports, imports and welfare gains. The discussion highlights predominantly positive Granger causality from imports to welfare gains in both MFI and LFI economies in the long-run. In addition, we find positive long-run Granger causality from exports to welfare gains in some economies such as India and Botswana. While we do not find direct empirical evidence of how causality runs from trade variables to welfare gains, we attempt to relate the results of the current study with a number of previous studies which investigate causality between exports, imports and economic growth.

There is empirical evidence that causality exists between exports, imports and economic growth. However, the results are heterogeneous across countries ranging from rejection of export led hypothesis to a significant support for either export led or import led growth. Jung and Marshall (1985) find that there exists no Granger causality between exports and growth for 22 out of a sample of 37 developing economies. They document only four economies indicating positive Granger causality which include Indonesia, Egypt, Costa Rica and Ecuador. Darrat (1987) investigates causal link between exports and growth in four Asian economies which include Hong Kong, South Korea, Singapore and Taiwan. Out of these economies, there exists causality only in South Korea which runs from exports to economic growth. On the other hand, Xu (1996) focusses on Granger causality between growth of exports and real GDP per capita in 21 developing economies. He supports the export led hypothesis for 17 countries out of a sample of 21 and rejects the same for remaining economies. Moreover, many studies from previous literature suggest evidence of bidirectional Granger causality between exports and economic growth (Bahmani-Oskooee, 1993; Holman and Graves, 1995; Doraisami, 1996; Biswal and Dhawan, 1998; Awokuse, 2005; Ismail and Harjito, 2009; Rahmaddi, and Ichihashi, 2011).

While there is a large literature which suggests that trade positively affects a country's economic performance, we find few studies which directly relate imports to economic growth and welfare gains.[220] This literature rests on the proposition put forward by Grossman and Helpman (1991), Barro and Sala-i-Martin (1995), Collin et al. (1996) and Kellor (2004) that liberalization of imports contribute in long-run economic growth because it allows developing economies to adopt existing technologies from more advanced countries. Krishna (2003)

220 Harrison and Rodríguez-Clare (2009) reviews a large body of literature on Trade growth nexus and establish that trade contributes in economic growth across economies.

document that causal effect on economic growth is appropriately explained by econometric specifications which either account for exports or imports separately or together in 20 out of the sample of 39 developing economies. Marwah and Tavakoli (2004) use time series from 1970 -1998 and observe that openness as measured by FDI inflows and imports contribute in economic growth and welfare of four East Asian Economies which include Indonesia, Malaysia, Philippines and Thailand. In addition, Thangavelu and Rajaguru (2004) support the hypothesis of import led productivity growth in selected Asian economies which include India, Indonesia, Malaysia, Philippines, Singapore and Taiwan. The results suggest that imports tend to show strong causal effects on productivity growth in the long- run and indicate that there is import led productivity growth in these economies. Herrerias and Orts (2011) also find that imports positively affect output and labour productivity in China for the period 1964-2004. Drilling down empirical literature even further, many studies document bidirectional causality between imports and economic growth (Liu et al, 1997; Anoruo and Ahmed, 2000; Kogid *et al* 2011; Zang and Baimbridge, 2012).

Our time series analysis attempts to tease out the direction of causality between exports, imports and welfare gains. The results show strong casual effects from imports to welfare gains in four MFI economies and two LFI economies. In addition, we observe export led welfare gains in economies of India and Botswana. These results are consistent with the extant empirical literature reviewed in the study on causality between exports, imports and economic growth. We interpret broad evidence related to this literature as suggesting that trade variables of exports and imports tend to have positive impact on welfare gains in the long-run.

Finally, we also conduct multivariate residual diagnostics in order to evaluate the estimated VAR or VECM models based on respective country specifications. We examine standard model assumptions and properties through tests for autocorrelation, non-normality and heteroscedasticity. We report multivariate residual based diagnostics for all co-integrated systems in the framework of VECM for MFI and LFI economies in Appendices 30-31. The standard assumptions of normality, no autocorrelation, and constant variance are satisfied at 5% levels of significance for all estimated VECM models. Appendices 32-33 contain information about VAR estimates as well as multivariate residual diagnostics for VAR processes in MFI and LFI economies respectively. These VAR processes evaluate short run effects of trade variables on welfare gains in LFI and MFI countries which do not show co-integration relations. The multivariate residual diagnostics for some VAR specifications have issues regarding autocorrelation and normality of residuals. One appropriate approach which helps to overcome non-normality issues is bootstrapping which may be considered in future research.

6.7 Overall Summary

In summary, this chapter explores the causal link between welfare gains measured in this thesis with trade channels of exports and imports. We begin the empirical analysis with the application of unit root tests to determine the order of integration of variables. We, then proceed to test for co-integration among the variables. The existence of co-integration indicates that there are potential casual relations among a set of integrated variables. This requires performing causality F-test on estimated VECM models. For this purpose, we conduct tests of weak and strong exogeneity based on Wald test. We perform causality F-test on estimated VAR models for countries which do not exhibit co-integration relations.

The estimation results clearly illustrate that the results of unit roots and co-integration tests are consistent. The main findings of the empirical analysis reveal import led welfare gains in four MFI and two LFI economies of co-integrated systems. Our results also indicate export led welfare gains in India and Botswana. Moreover, we find bidirectional causal paths from exports and imports to welfare gains for a number of countries. The discussion of results highlights that country-specific characteristics may play an important role in establishing short-run and long-run causality.

In addition, we obtain certain counter intuitive findings which indicate negative causality between imports and welfare gains. Caution is; however, appropriate in interpreting these results as long-run relationship of macroeconomic variables is a complex phenomenon. This process may require the inclusion of other macroeconomic variables in the empirical framework depending on country-specific characteristics whichis beyond the scope of this study. However, the use of a more standardized measure of welfare gains in terms of actual consumption relative to autarky opens potential avenues for further research to analyze the long-run association of trade and consumption channels in emerging and developing economies of the world.

CHAPTER 7
CONCLUSIONS AND POLICY RECOMMENDATIONS

7.1 Overview

This chapter provides a brief summary of the objectives and key outcomes of the current study. It highlights the main conclusions in the light of the results of welfare calculations and empirical findings discussed in previous chapters. We draw potential policy recommendations based on the discussion of the key findings. Finally, we briefly discuss the limitations of the current study and scope for further research. Sections 7.2 through 7.6 cover all these details. Section 7.7 presents the concluding remarks about this thesis.

This study examines the issue of welfare gains of international capital flows for two groups of emerging and developing economies classified in literature into MFIs and LFIs. In this study, we measure welfare gains of international capital flows by focusing directly on *country- specific* economic conditions. More specifically, we construct *time series* of welfare gains for emerging and developing economies to obtain deeper insights into the role of *country-specific* characteristics which contribute to welfare gains within countries over time. While liberalization of international capital flows to developing countries starts about three decades ago with the removal of capital controls, the question about welfare benefits of international capital mobility dates back to the neo-classical growth model developed by Solow (1956). One of the main motivations driving this study to construct time series of welfare gains is the essential idea that international capital mobility generates welfare benefits across countries and overtime. Welfare benefits result from international capital mobility because capital moves from low return locations to high return places. Moreover, these benefits do not disappear since the differential in the rates of return persists for a longer period of timethat is assumed by the neo-classical growth model. This argument allows foreign capital to continue to flow to most developing countries in a financially integrated economy. In addition to the existing findings, we contribute in the literature by constructing *country-specific* time series of welfare gains by incorporating time-varying country based characteristics in welfare calculations.

We measure welfare gains of international capital flows for four alternative cases. In the first case, we construct time series of welfare gains using the framework developed by GJ in the light of neoclassical economic model. In this baseline case, we specify time-varying *country-specific* parameter values of capital’s share in output, depreciation rates and TFP growth. However, we consider fixed value of time preference rate from the US economy. In the second case, we continue with the similar framework and compute welfare gains by using *country-specific* time discount factor calculated from real interest rates. This is calculated from equation (3.18). In the third case, we measure welfare gains by using the estimated value of time preference rate for each country. We estimate equation (3.19) through 2-SLS approach to obtain the value of the coefficient of previous period consumption referred to as the time preference rate. We, therefore, use three different values of patience parameter in the first three welfare measures which may reflect its sensitivity in welfare calculations within emerging and developing economies. Finally, in the fourth case, we use the framework modified by Hoxha et al. (2013) which integrates elements of endogenous growth into the neo-classical economic model. GJ implicitly assume that capital types are perfectly substitutable. Hoxha et al. (2013), on the other hand, consider that capital varieties are not perfect substitutes of each other. While they argue, that marginal product of any single type of capital is not affected by the stock of capital in the economy, we consider that marginal product of a capital variety may not be completely insensitive to the stock of capital in the economy overtime. Given the aggregate stock of capital, each firm behaves identically and produces a constant amount of each capital variety. Improvement in state of technology and increase in population results in an increase in each capital variety employed overtime. This allows for the construction of historical series of welfare gains for the fourth case in the current study.

We employ this welfare measure in the time series analysis to investigate the causal relationship between welfare gains, exports and imports in emerging and developing economies for the period 1961-2010.[221] The proposition of gains from trade is well established in the theoretical literature on international trade. While Smith (1776) is credited to start this debate of benefits from trade, Samuelson (1939) theoretically established this proposition and suggested that free trade produces Pareto optimal results across trading economies. Since then various strands of literature examine and investigate possible benefits from trade across countries at a point in time. We contribute in the existing literature by investigating the short-run and long-run relationship between welfare gains and trade variables within countries over time. It is an important research endeavour which attempts to determine the direction of causal path between trade variables of exports, imports and welfare gains in an effort to explain the welfare effects of trade.

221 As mentioned before, we use the welfare measure computed from the third case as it not only accounts for time varying country-specific parameters extracted from PWT 8 but also include the estimated value of time preference for each country.

We obtain relevant data from PWT version 8 which introduces some novel features in country-specific measures and allows for comparisons within an economy over time. Our contribution is thus twofold: first, we construct time series of welfare gains based on the idea that international capital mobility generates welfare gains across countries overtime. Secondly, we empirically investigate how trade channels of exports and imports affect welfare gains within countries in the short-run and long-run. This will help us seek new insights and intuition about the welfare impact of trade through exports and imports and provide potential avenues for further research regarding the macroeconomic effects of this key policy issue.

7.2 Welfare calculations: Conclusions

The results of welfare calculations suggest that welfare gains are affected by time-varying country-specific characteristics within economies. As countries continue to receive benefits of international capital mobility over time, these factors play an important role in welfare calculations. Overall welfare gains are higher in MFI economies relative to LFI economies. In the first welfare case, the results suggest that the ratio of welfare gains exceeds two in 12 countries out of a sample of 22 MFI economies at different points in time between1961-2010.[222] This implies more than two times increase in observed level of consumption relative to autarky.Out of these 12 countries, average annual observed level of consumption exceeds two times relative to autarky in 3 countries namely Brazil, Peru and South Africa for the years 1961-2010.

The welfare calculations in the second welfare measure indicate that the ratio of welfare gains is higher than two in 14 countries out of a sample of 22 MFI economies at different points in time from 1961-2010. Out of these 14 economies, international capital flows generate an average annual observed level of consumption which is two times higher relative to autarky in 4 countries namely Brazil, Columbia, Peru and South Africa over the period 1961-2010. In the third welfare case, the results suggest that ratio of welfare gains exceeds the benchmark level of two in 19 countries out of a sample of 22 MFIs economies at different points in time from 1961-2010. Out of these 19 countries, average annual observed level of consumption exceeds two times relative to autarky in 10 countries for the period 1961-2010. In the fourth and final welfare case, the results suggest that ratio of welfare gains exceeds the benchmark level of two in 7 countries out of a sample of 22 MFIs economies at different points in time from 1961-2010. However, average annual observed level of consumption relative to autarky remains below the benchmark level of two in all countries for the period 1961-2010.

222 The details of setting the benchmark welfare level of 2 in the current study are discussed in Chapter 4.

The analysis of time varying welfare effects also shows that welfare gains are higher in the third case for majority of MFI and LFI economies. In the third case, we use the estimated value of time preference rate β for each country in welfare calculations. This illustrates that time preference factor which indicates patience levels of economies also affect the size of welfare gains, in addition to domestic macroeconomic characteristics and conditions. Compared to case 2, the number of countries for which the ratio of implied welfare gains is more than 2 in different time periods increases from 14 to 19. In addition, the level of average annual welfare gains of international financial integration rises by more two in 10 countries over the period 1961-2010. This finding may suggest a specific link between welfare gains and patience levels of economies because welfare gains vary due to the change in the value of the patience parameter. Countries with lower values of β are more impatient and receive higher welfare gains relative to other economies.

Additionally, the fourth case of welfare calculations within countries provides an interesting finding. In this specific case, the results indicate that out of 22 MFI countries, financial integration generates welfare ratio greater than two in 7 economies at different points in time from 1961-2010 as compared to 12 in the first, 14 in the second and 19 in the third case respectively. Moreover, the average annual observed level of consumption relative to autarky remains below the benchmark welfare number of two in the fourth case for all countries of MFI group. This phenomenon is very interesting as the previous study by Hoxha et al. (2013) shows that welfare gains are higher when capital is not perfectly substitutable. While Hoxha et al. (2013) argue that marginal product of any single type of capital is not affected by the stock of capital in the economy; we find that welfare gains marginally decline if marginal product of each capital variety is not completely insensitive to the stock of capital in the economy overtime.

Thus, time-varying country-specific characteristics which may appear in the form of structural change indicating changing capital share and productivity growth provide a different perspective of welfare gains from international financial integration. We observe more or less similar trends across alternative welfare measures but country based elements of changing capital share, depreciation rate and productivity growth explain why some countries enjoy higher welfare benefits relative to others. These factors allow differential in the rates of return to capital to persist throughout out the period 1961-2010 and countries continue to reap benefits of international financial integration over time. In addition, the use of estimated value of time preference rate shows that patience levels of respective economies affect the size of welfare gains within developing economies. These results underscore the need to account for time-varying *country-specific* parameter values in welfare calculations.

To conclude this part of research, our analysis shows that welfare gains are notsmall in size in the range estimated by GJ nor big in numbers calculated by Hoxha et al. (2013). In that respect, country-specific time series of welfare gains provides a new perspective and more insights regarding welfare levels within an economy over time compared to a single welfare number suggested by cross country analysis at a point in time. Based on these findings, we may suggest time-varying country based characteristics are crucial in constructing time series of welfare gains and play an important role in explaining welfare comparisons within countries over time.

7.3 Short-run and long-run relationship of welfare gains and trade: Conclusions

We are often interested in the short-run and long-run relationships between economic variables to examine long-run trends as well as short-term fluctuations in the economy. The time series of welfare gains from international financial integration constructed in the current study reflects welfare levels of respective economies in terms of actual consumption relative to autarky.We extend the current research and empirically examine the causal effects from trade variables of exports and imports to welfare gains to determine the direction of causality between them in the short-run and long-run. Given the nature of the time series properties of three variables discussed in previous chapters, we find that there exist co-integration relations in 9 out of the 22 MFI economies and 6 out of the 29 LFI economies. We present conclusions for countries in co-integrated systems based on short-run and long-run analysis in the framework of VECM. For the remaining countries in both groups we suggest conclusions based on short-run causality by specifying an appropriate VAR framework.

Our results show that there exists long-run causality between exports, imports and welfare gains in a number of MFI and LFI economies and the direction of causality depends on country-specific trend characteristics of the three variables. The main finding suggests that welfare gains are import led in four MFI and two LFI economies. In addition, we also obtain evidence of export led welfare gains in one MFI and LFI economy. As mentioned earlier, many previous works investigate the issue of Granger causality between trade and economic growth. We contribute in this literature by extending this research into the realm of welfare gains in an attempt to evaluate the short-run and long-welfare effects of trade.

We find evidence of import led welfare gains in Indonesia, Israel, Korea and Thailand. This evidence suggests that imports contribute more in consumer welfare through higher consumption relative to producer welfare. At about the same time, these economies show negative impact from exports to welfare gains which implies that exports enhance producer gains relative to consumer welfare. The overall welfare, however, may depend on the relative strength of the import and export effects. The empirical estimates show that the coefficient of imports is greater than the coefficient of exports in countries which show positive relationship of imports to welfare gains. This tends to support the argument that the import effect may dominate the export effect in countries which show positive and significant long run causal effect from imports to welfare gains.

Our time series analysis also reveals another interesting evidence of export led welfare gains in two economies such as India and Botswana. These countries which enjoy benefits of exports driven welfare gains are also associated with the negative impact of imports on welfare gains. Although this evidence should be interpreted with caution, however, we have seen that if the income effect generated by the exports outweighs substitution effect for imported goods, then there exists a possibility of exports driven welfare gains such as the ones found in India. Whether welfare gains are import led or export led, in in both the scenarios, our results are consistent with the commonly held view that trade contributes in improving the standards of living of the people.

The existence of bi-directional causality between imports and welfare gains in MFI economies is another main outcome of the current research. We find bi-directional causality between imports and welfare gains for Indonesia, Korea and Thailand. India, on the other hand, is the only MFI economy which shows bi-directional causality between exports and welfare gains. Interesting, however, we find no evidence of either import or export led welfare gains in certain MFI economies which include Brazil, Egypt, Malaysia and Singapore. In such cases, causality runs in the reverse direction from welfare gains to either exports or imports.

We also explore short-run causal relations in countries where co-integration is not present. The main finding is that short-run causality runs from imports to welfare gains in 3 MFI economies which include Argentina, Hong Kong and Mexico. However, imports show negative impact on welfare gains. Causality also runs in the reverse direction in 9 MFI economies. In addition, short-run analysis reveals that causality runs from exports to welfare gains in 4 MFI economies which include Hong Kong, Mexico, Peru and Turkey. It is positive in case of Mexico, Peru and Turkey and negative in case of Hong Kong. With regard to exports we do not find any evidence of reverse causality in MFI economies.

7.4 Policy implications

Our findings about welfare calculations and causality between trade and welfare gains have potential policy implications. First, our country focused discussion suggests that country-specific features of respective economies provide a broader picture of evaluating welfare effects of international capital flows. International capital flows are regarded as an important source of economic growth and welfare of capital scarce economies. Our analysis highlights that welfare gains results from the differential in the rates of return across countries and over time. Based on the varied experiences across countries especially in East Asian and Latin American countries, we see that international capital flows can be both welfare enhancing as well as a source of macroeconomic volatility. It is, therefore, important that policy makers should incorporate relevant country based characteristics in welfare enhancing policies aimed at improving the standards of living of the people. Specifically, in Korea, the role of the government in getting the various interventions right emphasize that domestic economic priorities should be aligned with trade liberalization policies to promote sustained economic growth. Indian experience, on the other hand, suggests that liberalization policies should not focus only on opening trade but also incorporate pro-business reforms for the benefit of the people.

Secondly, country based characteristics merit attention since our discussion suggests that they play an important role in shaping welfare outcomes. One of the essential ideas of the current study is that countries continue to reap welfare benefits over time. Policy makers should consider that mere magnitude of capital inflows may not translate into long- term growth, as is illustrated by the crises which hit many economies and resulted in capital outflows leading to serious economic problems. In order to avoid these financial crises, we may suggest capital account liberalization and domestic economic priorities should be aligned to create better welfare outcomes for developing countries. Moreover, countries should focus on attracting foreign capital for long-term growth instead of a short-term solution.

Thirdly, our results indicate positive long-run impact of imports and exports on welfare gains which emphasize the role of trade in stimulating economic growth and welfare. In particular, the main implication of import led welfare gains in countries such as Korea is that investment induced imports are important for smooth and sustained improvement in the living standards of the people. It contributes in higher per capita income which improves the welfare prospects through increase in consumption. It also qualifies the conventional argument that imports contribute in higher consumption gains relative to production gains. In such a situation, an appropriate trade policy approach should focus on encouraging imports and investment to adequately address concerns of the people for higher consumption gains.

Fourthly, we highlight that open economy considers trade in international capital flows as well as trade in goods and services. This suggests a close connection between integration of financial markets and goods markets which is important for realizing the gains from financial globalization. Our results show that welfare gains are affected by trade variables of exports and imports. These results therefore are consistent with Ford and Horioka (2017) who also emphasize the global integration of both capital markets and goods markets for reallocation of capital from countries where returns are low to countries with relatively higher returns. One plausible policy implication which emerges from empirical findings is that countries need to introduce policies which focus on integrating both the financial markets and goods markets. These policies can help achieve net transfers of financial capital between countries and contribute tohigher welfare gains for the people.

Finally, at the regional level countries should work out arrangement on the patterns of Chiang Mai Initiative (CMI) to avoid the adverse effects of volatility in international capital flows. It provides regional safety nets to manage short-term liquidity problems in Asian countries. [223] Such multilateral initiatives should be encouraged to avert financial and currency crisis in emerging and developing economies.

7.5 Limitations of the study

There are several limitations of the current thesis. First of all, we follow the standard assumptions of the theoretical literature on economic growth and welfare. This literature suggests that capital moves from capital abundant countries to capital scarce economies. Consequently, our whole discussion is based on the assumption that there are welfare benefits of international capital flows. This assumption has been questioned by Lucas (1990) in an attempt to determine whether capital really flows from rich to the poor countries. This assumption requires the bulk of future investment to take place in low income countries. But Alfaro et al. (2008) suggest that there are additional factors which are important for international capital flows to move from rich to poor countries. One such factor is the quality of institutions. We construct the time series of welfare gains for the period 1961-2010. However, the time series data on institutions is not available for such a long duration which constrains us from conducting country-specific analysis by including this variable.

Secondly, we are using the data on real interest rates to calculate time discount factor based on Fischer's (1930) approach in welfare calculations. We obtain data on real interest rate from WDI. Since data on real interest rates was not available for all the years from WDI, we obtain the average based on the available number of years. Thirdly, we measure welfare gains based on the assumption that capital is not perfectly substitutable. For this purpose, we calibrate the fourth series of welfare gains assuming a median value of elasticity of substitution from previous works. These studies estimate elasticity of substitution using industry level data such

223 These countries include 10 ASEAN economies, China, Japan and South Korea.

as information technology, mining industry and aircraft industry (Chun and Mun, 2006; Goolsbee and Gross, 2000). Estimating the elasticity of substitution across capital types is a full-fledge project by itself which requires data on capital types. However, the data on capital types is not easily available. Estimating elasticity of substitution is nevertheless possible based on the availability of data in specific industries and may be undertaken in future research to explain the link between capital types and welfare gains.

7.6 Scope for further research

Our welfare calculations and empirical findings also provide potential avenues and scope for further research. We construct the time series of welfare gains in an attempt to identify relevant channels which have an impact on welfare gains. One of the key implications of the current research is that international capital mobility generates continuing welfare gains within economies over time. It emphasizes the need to account for both short-term fluctuations and long-run trends. Sincemost of the research focuses on neoclassical model of long-run economic growth, one possible area of future research is to explore the possibility of employing stochastic growth models which can integrate short-term fluctuations with long-run growth analysis.

We use the estimated value of the time preference rate (β) in country-specific welfare calculations. We employ the 2SLS approach to estimate the model to extract the value of this parameter. This approach is problematic when the instruments are not valid or weakly relevant in the model. Work requiring more instruments will be an interesting area of research in future. Alternatively, future research can adopt a more parsimonious approach in the selection of instruments. One alternative useful technique that is being adopted in macroeconomics and finance literature is GMM. This technique which allows the use of lagged differences or the lagged levels as instruments in the model is similar to instrumental variable approach to estimation under standard moment conditions.

We explain the divergent trends of welfare gains in selective economies of Asia, Africa, and Latin America. These welfare gains are based on parameters explained in the theoretical framework. The computation process therefore accounts for sources of welfare gains from the theoretical perspective. In the empirical part, our focus is to test the short-run and long-run relationship of trade variables of exports and imports with welfare gains. The divergent trends of welfare gains in different economies appear rather intriguing and require more emprical work to establish additional sources of welfare gains. This is another avenue for future research which can be accomplished by incorporating new sources of welfare gains in an econometric model.

Multivariate normal distribution constitutes one of the key characteristics of multivariate analysis in econometrics. Our results about country wise 2SLS and vector autoregressive estimates for different countries have issues regarding autocorrelation and normality of the residuals. One appropriate approach which helps to overcome non-normality issues is bootstrapping. This approach allows bootstrapping residuals under the assumption that errors are independent and identically normally distributed. The process of residual bootstrap holds the regressors fixed at the sample values and replaces the estimated values through bootstrap draws from the original sample residuals (Cameron and Trivedi, 2010). This method improves the results by reducing the bias because it permits us to infer the features of the sampling distribution of an estimator, particularly its asymptotic variance (Green, 2012). Work using this approach of performing statistical inference by resampling can be an interesting area of future research.

Last but not the least, there is evidence of causality between trade and economic growth. We contribute in this literature by investigating causality between trade and welfare gains. Another key implication of the current study is that causality depends on country-specific features. It would be useful to conduct comprehensive and detailed country level studies to further understand the factors contributing in welfare gains and their connection with the trade variables of exports and imports. This is important because there is no one way causal relationship between trade and welfare gains at all times and for all countries. We have identified several country cases of import led and export led welfare gains. Future research with the focus on country-specific features will not only provide additional insights about the role of international capital flows in economic development and welfare but also contribute in empirically addressing issues related to causality between trade and welfare.

7.7 Concluding remarks

In the final analysis, we conclude that the question of big and small welfare gains remains an open question and requires more focus on countries' respective macroeconomic conditions to find an appropriate solution. This study contributes to the literature by measuring time series of welfare gains from international financial integration to investigate the issue of how big or small are welfare gains given country-specific characteristics of a developing economy. Following GJ, we also acknowledge the role of trade along with international financial integration in enhancing the standards of living of the people.

GJ's argument, therefore, suggests a link between welfare gains and international trade. We explore this link and examine the direction of causality from exports and imports to welfare gains. Previous works show that there exists evidence of causality between exports, imports and economic growth. Our work departs from the previous works by investigating causality with a new measure of welfare gains expressed in terms of actual consumption relative to autarky. Our finding of positive long-run impact of imports and exports on welfare gains provides space for further research to extend the debate of the role of trade in economic welfare. This also lends support to the argument which prevails in the 1980s and 1990s that international financial integration along with trade channels of exports and imports are important for promoting growth and improving the standards of living of the people in emerging and developing countries.

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Appendix 1A:
Classification and sample of countries

Serial No	**More Financially Integrated Countries (MFIs)**	**Less Financially Integrated Countries (LFIs)**
1.	Argentina	Bangladesh
2.	Brazil	Benin
3.	Chile	Bolivia
4.	China	Botswana
5.	Columbia	Burkina Faso
6.	Egypt	Burundi
7.	Hong Kong (SAR)	Cameroon
8.	India	Costa Rica
9.	Indonesia	Côte d'Ivoire
10.	Israel	The Dominican Republic
11.	Republic of Korea	Ecuador
12.	Malaysia	El Salvador
13.	Mexico	Gabon
14.	Morocco	Ghana
15.	Pakistan	Guatemala
16.	Peru	Honduras
17.	Philippines	Jamaica
18.	Singapore	Kenya
19.	South Africa	Mauritius
20.	Thailand	Niger
21.	Turkey	Nigeria
22.	Venezuela	Panama
23.		Paraguay
24.		Senegal
25.		Sri Lanka
26.		The Syrian Arab Republic
27.		Togo
28.		Tunisia
29.		Uruguay

Source: Prasad *et al*, 2003

Appendix 1B: Regional groupings

Serial No	Asia MFIs	Asia LFIs	Africa MFIs	Africa LFIs	Latin America MFIs	Latin America MFIs
1	China	Bangladesh	Egypt	Benin	Argentina	Bolivia
2	Hong Kong	Sri Lanka	Morocco	Botswana	Brazil	Costa Rica
3	India	Syria	South Africa	Burkina Faso	Chile	Ecuador
4	Indonesia			Burundi	Columbia	El Salvador
5	Israel			Cameroon	Mexico	Guatemala
6	Korea			Côte d’Ivoire	Peru	Honduras
7	Malaysia			Dominican Republic	Venezuela	Jamaica
8	Pakistan			Gabon		Panama
9	Philippines			Ghana		Paraguay
10	Singapore			Kenya		Uruguay
11	Thailand			Mauritius		
12	Turkey			Niger		
13				Nigeria		
14				Senegal		
15				Togo		
16				Tunisia		

Appendix 2:

a. Derivation of the Euler Equation under the neoclassical model of optimal savings

The utility function of a representative household takes the following form[224]:

$$V_t = \sum_{t=0}^{\infty} \beta^t (1+n)^t \ u(c_t) \qquad (1)$$

β is the subjective discount factor. n shows population growth rate. c_t is consumption per capita, and $u(c_t) \equiv {c_t}^{1-\sigma}/1-\sigma$ is constant relative risk aversion instantaneous utility function with coefficient $\sigma > 0$ indicating relative risk averse preferences. Alternatively, when $\sigma = 1$, utility function is $u(c,t) = \ln(c_t)$ which indicates log preferences.

The production of output in domestic economy occurs according to the Cobb-Douglas production function which is given as follows:

$$Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha} \qquad (2)$$

Where K_t represents stock of domestic capital, L_t is labour supply, and A_t denotes labour augmenting measure of productivity. It means:

$$\lim_{t\to+\infty} g_t = (g)^* \qquad (3)$$

The dynamic budget constraint of each economy takes the following form:

$$\hat{k}_{t+1} = (1 - \delta - n - g)\hat{k}_t + \hat{y}_t - \hat{c}_t \qquad (4)$$

This constraint is based on the assumption that $\hat{x}_t = \frac{x_t}{A_t N_t}$ which represents productivity and population normalized variables.

In the above budget constraint, δ is the depreciate rate, n is the population growth rate, g is the productivity growth rate. The terms hat in the above equation in a variable expressed in per efficiency unit terms. Since $\hat{y}_t = f(\hat{k}_t)$ the above budget constraint can be written as:

$$\hat{k}_{t+1} = (1 - \delta - n - g)\hat{k}_t + f(\hat{k}_t) - \hat{c}_t \qquad (5)$$

GJ and Hoxha et al. (2013) further assume, individuals prefer more about consumption per person instead of consumption per efficiency unit. As a result, the term inside the felicity function is modified as follows:

$$V_t = \sum_{t=0}^{\infty} \beta^t (1+n)^t \ u(c_t) \qquad (6)$$

$$V_t = \sum_{t=0}^{\infty} \beta^t \, u(c_t E_t) \qquad (7)$$

This form of the utility function is used to derive the Euler equation. The term $c_t E_t$ simply shows consumption per person under the assumption of technological change in the production

224 As we will derive Euler equations for two production structures, we follow notations from Hoxha et al. (2013) who maintain representative agent framework of Gourinchas and Jeanne (2006) in their analysis.

structure of the economy. Utility maximization delivers the Euler equation. The process is as follows:

First, write Lagrangian function given the modification in the felicity function:

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t\, u(c_t E_t) + \lambda_t \left[(1 - \delta - n - g)\hat{k}_t + f(\hat{k}_t) - \hat{c}_t - \hat{k}_{t+1}\right] \qquad (8)$$

Maximize the above Lagrangian function with respect to c_t for each of the infinite number of periods. However the first order conditions obtained for first two periods highlight the rules under which an economy operates. These are as follows:

$$\frac{\partial \mathcal{L}}{\partial c_t} = \beta^t u'(c_t E_t) E_t - \lambda_t \; = 0 \qquad (9)$$

$$\frac{\partial \mathcal{L}}{\partial c_{t+1}} = \beta^{t+1} u'(c_{t+1}\, E_{t+1}) E_{t+1} - \lambda_{t+1} \; = 0 \qquad (10)$$

$$\frac{\partial \mathcal{L}}{\partial \hat{k}_{t+1}} = \lambda_{t+1} \left[f'(\hat{k}_{t+1}) + (1 - \delta - n - g)\right] - \lambda_t \; = 0 \qquad (11)$$

Solve the first order conditions by elimination of the Lagrange multipliers and make use of the accumulation function of the technology which states: $E_{t+1} = (1 + g)E_t$ in order to obtain the Euler equation of the following form:

$$\frac{u'(c_t)}{u'(c_{t+1})} = \beta(1 + g)\left[f'(\hat{k}_{t+1}) + (1 - \delta - n - g)\right] \qquad (12)$$

The above Euler equation explains consumption growth depends on three factors. These factors include subjective discount factor β, the interest rate $\left[f'(\hat{k}_{t+1}) + (1 - \delta - n - g)\right]$ as well on the growth rate of technology $(1 + g)$. The additional factor of the growth rate of technology shows that it provides boost to the economy and results in permanent increase in consumption over time. As we are using the Euler equation with technological change with constant relative risk averse utility function, we also need to determine the explicit solution. In order to obtain an explicit solution of Euler equation with technological change, the intensive of the production function is specified as follows based on equation (2).[225]

$$\hat{y}_t = \hat{k}_t^{\,\alpha} \qquad (13)$$

The constant relative risk aversion (CRRA) utility function takes the following form:

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma} \qquad (14)$$

225 The process of deriving the intensive form is explained in growth discussion in chapter 2

Using the intensive of the Cobb- Douglas production function, the rate of return to unit capital can be defined as:

$$R_{t+1} = \alpha \hat{k}_{t+1}^{\alpha-1} + (1 - \delta - n - g) \qquad (15)$$

It says that rate on unit capital is equal to the marginal product of capital plus 1 minus delta. δ is the depreciation term and "1" appears because it is the gross return in the above expression. n denotes th growth rate of population and g shows productivity growth in the economy. Using the felicity function, the Euler equation which results from utility maximization problem is

$$\frac{c_t{}^{-\sigma}}{\beta c_{t+1}{}^{-\sigma}} = (1+g)\, \alpha \widehat{k}_{t+1}^{\alpha-1} + (1 - \delta - n - g) \qquad (16)$$

Using equation (15) and simplifying further equation (16), the final form of the Euler equation in explicit form is obtained. This Euler equation is determined using the Ramsey model with technological growth from utility maximization problem which is as follows

$$\hat{c}_{t+1} = \hat{c}_t \frac{(\beta R_{t+1})^{1/\sigma}}{1+g} \qquad (17)$$

In the above equation, $\hat{c}_t$ shows consumption in current period, $\hat{c}_{t+1}$ denotes consumption in period 1 which is the following period, R_{t+1} indicates the return on unit capital which is also described as the marginal product of capital. g is the total factor productivity growth, and σ is the coefficient of the risk aversion. An important characteristic of the above Euler equation (4.9) shows that the economy discounts future consumption with discount factor as well as the growth rate of technology. This means that higher productivity growth encourages current consumption at the cost of the future consumption. However, the economy still enjoys enormous future consumption as growth rate of technology takes care of it with requiring saving on the part of the households. The Euler equation with technological growth only discounts future consumption with the discount factor.

b. Derivation of the Euler Equation under the neoclassical model of optimal savings with elements of endogenous growth:

Hoxha et al. (2013) maintains optimization framework of GJ explained in equation (1). They, however, set out from the constant returns to scale production function and develop a model with capital varieties as imperfect substitutes. The production function employed by Hoxha et al. (2013) takes the following form[226]:

226 Hoxha et al. (2013) borrow this production structure from Broda et al (2006).

$$Y_t = (A_t L_t)^{1-\alpha} \left(\sum_{i=0}^{M_t} X_{it}{}^{\epsilon} \right)^{\frac{\alpha}{\epsilon}} \quad (18)$$

Equation (3.6) shows that economy produces the final output Y_t using labour and M different capital varieties of intermediate goods denoted by X_i. A_t denotes labour augmenting measure of productivity. L_t denotes labor supply. Labour receives the share $1-\alpha$ of output from the economy, while different forms of capital varieties regarded as imperfect substitutes get the share α. ϵ is the coefficient of production function for capital types. The productivity and population normalized variables are denoted as $\hat{x}_t = \frac{x_t}{A_t N_t}$ in Hoxha et al. (2013), which lead to the following dynamic budget constraint for each economy,

$$\hat{k}_{t+1}(1+n)(1+g) = (1-\delta)\hat{k}_t + \hat{y}_t - \hat{c}_t \quad (19)$$

In the above budget constraint, δ is the depreciate rate, n is the population growth rate, g is the productivity growth rate. The terms hat in the above equation shows a variable expressed in per efficiency unit terms. It is based on the assumption that capital and assets are equal to each other in the financial sector.We use the second production function with varying substitution parameter employed by Hoxha et al. (2013). It describes that capital varieties are imperfect substitutes. Broda *et al* (2006) explain that consumption goods are considered as imperfect substitutes when they investigate the impact of product variety in the context of trade and growth. It departs from the standard neo classical production function and assumes that the value substitution parameter epsilon is less than one but greater than capital share in output such that $\alpha < \in \leq 1$. This form of production technology shows that the economy produces the final good by using labour and intermediate goods (also referred to as different capital varieties). That is why this form of production function does not make any distinction between capital and other intermediate goods. Following Broda et al (2006), the production function employed by Hoxha et al. (2013) takes the following form:

$$Y_t = (A_t L_t)^{1-\alpha} (\textstyle\sum_{i=0}^{Mt} X_{it}{}^{\epsilon})^{\alpha/\epsilon} \quad (20)$$

Equation (20) shows that economy produces output using labour and various capital varieties denoted by X_i. Labour receives the share $1-\alpha$ of output from the economy, while different forms of capital varieties regarded as imperfect substitution get the share α.

Using the assumptions of Hoxha et al. (2006), this production function is modified to obtain an aggregate production function. Imagine a single monopolistically competitive firm produces each variety of capital in an economy. The firm uses the quantity of final good in the production of capital varieties. With this assumption, it is considered that the quantity of consumption given up equal to aggregate capital stock in the economy. Mathematically, it means

$$K_t = \sum_i^{Mt} X_{it} \quad (21)$$

It is assumed that firms are homogeneous. It means the capital varieties produced by firms are $X_{it} = X_t$. Using this argument, equation (3.13) becomes:

$$K_t = M_t X_t \quad (22)$$

Combining (22) and (20), the following production function is derived:

$$Y_t = K_t^{\alpha/\epsilon}(A_t L_t)^{1-\alpha/\epsilon} X_t^{\alpha-\alpha/\epsilon} \quad (23)$$

Finally, it is assumed $X_t = A_t L_t$ in the light of the optimal decision made by the firm for each variety of capital in order to obtained final form of the aggregate production function which is as follows:

$$Y_t = K_t^{\alpha/\epsilon}(A_t L_t)^{1-\alpha/\epsilon} \quad (24)$$

This assumption explains that the cost of entry of a capital variety producer is fixed and proportional to $A_t L_t$. The implication of this assumption is that the amount of each capital variety per efficiency unit does not change. We adopt this assumption in order to avoid any scale effect which may arise and create data issues (Jones, 1995). Moreover, it helps in isolating the gains coming from financial capital flows in alleviating capital scarcity rather than overall growth (Voiglander and Voth, 2006). This production function differs from the previous neo classical production in the sense that the elasticity of output with respect to capital is indicated by α/ϵ. In case of neo classical production capital share of output which is α also equals elasticity of output with respect to capital. In order to obtain an explicit solution of Euler equation with technological change, the intensive of the production function is specified as follows based on equation (24).[227]

$$\hat{y}_t = \hat{k}_t^{\frac{\alpha}{\epsilon}} \quad (25)$$

The constant relative risk aversion (CRRA) utility function takes the following form:

$$u(c) = \frac{c^{1-\sigma}}{1-\sigma} \quad (26)$$

Using the intensive of the Cobb- Douglas production function, the rate of return to unit capital can be defined as:

$$R_{t+1} = \alpha \hat{k}_{t+1}^{\alpha/\epsilon-1} + (1-\delta) \quad (27)$$

227 The process of deriving the intensive form is explained in growth discussion in chapter 2

It says that rate on unit capital is equal to the marginal product of capital plus 1 minus delta. δ is the depreciation term and "1" appears because it is the gross return in the above expression. n denotes th growth rate of population and g shows productivity growth in the economy. Using the felicity function, the Euler equation which results from utility maximization problem is

$$\frac{c_t^{-\sigma}}{\beta c_{t+1}^{-\sigma}} = (1+g)\,\alpha \widehat{k}_{t+1}^{\alpha/\epsilon - 1} + (1-\delta) \qquad (28)$$

Using equation (27) and simplifying further equation (28), the final form of the Euler equation in explicit form is obtained which is the same as equation (17).

$$\hat{c}_{t+1} = \hat{c}_t \frac{(\beta R_{t+1})^{1/\sigma}}{1+g}$$

We use this Euler equation in autarky in order to determine consumption under autarky.

Appendix 3: Time discount factors derived from real interest rate for MFIs and LFIs

Serial No	**MFIs**	**Time Period**	**Beta Value**	**LFIs**	**Time Period**	**Beta value**
1.	Argentina	1994-2014	0.96	Bangladesh	1976-2014	0.93
2.	Brazil	1997-2014	0.7	Benin	1977-1992	0.91
3.	Chile	1997-2014	0.9	Bolivia	1979-2014	0.94
4.	China	1979-2014	0.98	Botswana	1980-2014	0.96
5.	Columbia	1986-2014	0.9	Burkina Faso	1977-1992	0.92
6.	Egypt	1976-2014	0.97	Burundi	1978-2014	0.96
7.	Hong Kong (SAR)	1990-2014	0.95	Cameroon	1979-2007	0.90
8.	India	1978-2014	0.94	Costa Rica	1982-2014	0.93
9.	Indonesia	1986-2014	0.94	Côte d'Ivoire	1977-1992	0.92
10.	Israel	1979-2014	0.88	The Dominican Republic	1991-2014	0.90
11.	Republic of Korea	1987-2014	0.96	Ecuador	1980-2006	0.80
12.	Malaysia	1993-2014	0.96	El Salvador	-	0.96
13.	Mexico	1993-2014	0.95	Gabon	1979-2007	0.91
14.	Morocco	1978-2005	0.95	Ghana	1978-1987	1.21
15.	Pakistan	-	0.98	Guatemala	1978-2014	0.94
16.	Peru	1986-2014	0.87	Honduras	1982-2014	0.91
17.	Philippines	1976-2014	0.97	Jamaica	1976-2014	0.94
18.	Singapore	1978-2014	0.95	Kenya	1971-2014	0.94
19.	South Africa	1961-2014	0.96	Mauritius	1981-2014	0.92
20.	Thailand	1976-2014	0.94	Niger	1977-1992	0.91
21.	Turkey	-	0.96	Nigeria	1970-2014	1.02
22.	Venezuela	1984-2014	1.03	Panama	1986-2014	0.93
23.				Paraguay	1990-2014	0.86
24.				Senegal	1977-1992	0.92
25.				Sri Lanka	1978-2014	0.96
26.				The Syrian Arab Republic	1978-2007	1.01
27.				Togo	1976-1992	0.92
28.				Tunisia	1978-1989	1.00
29.				Uruguay	1976-2014	0.83

Source: Calculations based on available WDI data for real interest rates for MFIs and LFIs
Data for Pakistan, Turkey and El Salvador is not available. We take the value of Pakistan from Waqas et al (2012). For Turkey and El Salvador, we continue to assume the value of 0.96.

Appendix 4A: Estimated values of Time preference rates for MFIs (Method: 2SLS)

	Argentina	Brazil	Chile	China	Columbia	Egypt	Hong Kong	India	Indonesia	Israel
Variables	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**
Lagged consumption	0.91*** (0.04)	0.87*** (0.08)	0.83*** (0.16)	0.77*** (0.09)	0.93*** (0.03)	1.01*** (0.03)	0.88*** (0.061)	0.98*** (0.04)	0.78*** (0.06)	0.74*** (0.10)
Income	0.01 (0.05)	0.07 (0.05)	0.01 (0.15)	0.01 (0.01)	0.12*** (0.04)	-0.05 (0.03)	0.04 (0.03)	0.04*** (0.01)	0.16*** (0.03)	-0.03 (0.05)
D1	701.69*** (121.17)		-1003.41*** (280.01)		-230.25*** (35.97)				-93.99* (52.76)	
D2	852.79*** (128.04)		-558.27* (290.84)		-427.44*** (83.96)				-85.42*** (24.12)	
D3			-1413.81*** (471.63)		-342.88*** (86.62)					
D4			-1284.17*** (468.03)							
D5			-1620.37** (523.11)							
D1*Adjusted trend						18.99*** (2.79)				
D2*Adjusted trend										
Trend			54.47* (28.83)	5.34** (2.34)						76.14** (32.94)
Adjusted trend		8.76*** (2.35)		4.38** (1.93)		11.63*** (2.32)	21.48*** (5.83)			
Constant	152.11 (388.48)	3.26 (74.94)	347.56* (255.81)	92.15** (36.37)	-137.85 (86.01)	69.73** (26.48)	246.02*** (84.86)	-33.69 (22.30)	11.14 (18.93)	840.12** (386.09)
Observations	51	51	51	49	51	51	51	51	51	51
R-square	0.99	0.98	0.98	0.99	0.98	0.99	0.99	0.99	0.99	0.99

Appendix 4A (Continued): Estimated values of Time preference rates for MFIs (Method: 2SLS)

	Korea	Malaysia	Mexico	Morocco	Pakistan	Peru	Philippines	Singapore	South Africa	Thailand
Variables	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**
Lagged consumption	0.83*** (0.22)	0.95*** (0.07)	0.94*** (0.08)	0.73*** (0.11)	0.78*** (0.09)	0.78*** (0.15)	1.04*** (0.03)	0.90*** (0.06)	0.90*** (0.04)	0.80*** (0.06)
Income	0.05 (0.11)	0.02 (0.02)	-0.03 (0.04)	-0.71** (0.35)	0.10* (0.05)	0.06 (0.07)	-0.04 (0.03)	0.04* (0.02)	0.06** (0.03)	0.03 (0.02)
D1				-394.92*** (113.04)			77.09*** (22.47)	-788.45*** (85.43)		-258.48*** (61.46)
D2							-187.47*** (46.41)			76.02* (44.29)
D3							-173.81** (70.80)			
D4										
D5										
D1*Adjusted trend			-32.79*** (3.44)							
D2*Adjusted trend			11.93*** (3.67)							
Trend	23.52*** (7.75)			41.02** (18.73)						7.79* (3.97)
Adjusted trend						24.46** (9.53)	17.83*** (5.12)		4.02*** (1.09)	
Constant	-49.64 (63.32)	64.70 (87.12)		1029.69** (449.75)	128.69*** (44.71)	166.03* (89.20)	52.64 (52.31)	97.61** (47.76)	-88.50 (127.27)	136.35*** (39.90)
Observations	51	51	51	51	51	51	51	51	51	51
R-square	0.99	0.97	0.96	0.93	0.96	0.98	0.99	0.99	0.98	0.99

Appendix 4A (Continued): Estimated values of Time preference rates for MFIs (Method: 2SLS)

	Turkey	Venezuela
Variables	**Consumption**	**Consumption**
Lagged consumption	0.76*** (0.16)	0.79*** (0.06)
Income	0.14 (0.11)	0.02 (0.04)
D1	325.25** (153.68)	202.49* (117.31)
D2		739.71*** (112.21)
D3		
D4		
D5		
D1*Adjusted trend		
D2*Adjusted trend		
Trend		
Adjusted trend		
Constant	153.75 (112.11)	362.97 (306.95)
Observations	51	51
R-square	0.98	0.97

Notes: Adjusted trend illustrates the increasing or decreasing pattern in the data of actual per capita consumption. Trend is simply defined as the time trend. D1, D2, D3, D4, D5 are the dummies used in the estimation. They take the value of 1 in case of a change in intercept or break in the data or zero otherwise. D*trend is the interaction term of the respective dummy with the trend. D*T is the interaction term of the respective dummy with the adjusted trend. Standard errors are reported in the parenthesis.*, **, *** shows 10%, 5%, and 1% level of significance respectively. For some countries, dummies identified are not reported as these were not significant. Instruments include lags of income.

Appendix 4B: Estimated values of Time preference rates for LFIs (Method: 2SLS)

	Bangladesh	Benin	Bolivia	Botswana	Burkina Faso	Burundi	Cameroon	Costa Rica	Côte d'Ivoire	Dominic Republic
Variables	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**
Lagged consumption	0.94*** (0.04)	0.88*** (0.06)	1.06*** (0.01)	0.88*** (0.05)	0.28** (0.12)	0.59*** (0.12)	0.89*** (0.30)	0.95*** (0.12)	0.73*** (0.08)	0.47*** (0.13)
Income	0.05*** (0.02)	0.07 (0.04)	-0.06** (0.02)	0.04 (0.02)	0.17* (0.08)	0.04 (0.08)	0.09*** (0.03)	-0.03 (0.11)	0.16*** (0.05)	0.36*** (0.09)
D1				262.38*** (65.18)	-50.05* (27.42)	42.19*** (9.85)			-169.51*** (52.81)	
D2						28.20** (11.29)				
D3										
D4										
D5										
D1*Adjusted trend										
D1*trend		4.66* (2.45)	-8.08* (5.13)							
D2*trend				5.48*** (1.81)						
Trend										
Adjusted trend					9.05*** (2.91)		2.76** (1.30)	10.14* (5.77)		49.75** (20.41)
Constant	-3.22 (49.54)	21.32 (19.06)	144.77 (63.73)	46.69*** (14.23)	211.75*** (53.48)	123.16*** (33.48)	-43.86 (46.83)	287.25 (177.20)	106.97 (90.81)	122.21 (95.91)
Observations	51	51	51	51	51	51	51	51	51	51
R-square	0.92	0.94	0.99	0.99	0.90	0.82	0.96	0.97	0.82	0.98

Appendix 4B (Continued): Estimated values of Time preference rates for LFIs (Method: 2SLS)

	Ecuador	El Salvador	Gabon	Ghana	Guatemala	Honduras	Jamaica	Kenya	Mauritius	Niger
Variables	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**
Lagged consumption	0.88*** (0.05)	0.78*** (0.22)	0.69*** (0.08)	0.39** (0.17)	0.83*** (0.07)	0.63*** (0.16)	0.81*** (0.08)	0.74*** (0.07)	0.75*** (0.06)	0.81*** (0.09)
Income	0.07*** (0.01)	0.37 (0.52)	0.06* (0.03)	0.51*** (0.14)	0.05 (0.04)	0.20 (0.13)	0.11 (0.08)	-0.27** (0.12)	0.10* (0.05)	0.12*** (0.04)
D1	-107.93*** (18.39)						-177.45*** (54.44)	-80.04** (35.01)	1222.84*** (334.28)	
D2	153.57*** (45.47)							68.62*** (23.12)		
D3										
D4										
D5										
D1*Adjusted trend										
D1*Trend										-6.55*** (2.09)
D2*Trend										
Trend				1.42** (0.72)						
Adjusted trend		1.36* (0.67)			4.10*** (1.01)	9.28*** (3.33)		4.53*** (1.33	72.15*** (11.62)	
Constant	21.60 (46.54)	10.04 (36.05)	416.10* (224.45)	-82.09 (64.71)	206.94*** (54.21)	173.60* (93.61)	164.99 (282.64)	552.41*** (164.58	498.15*** (116.80)	-3.92 (30.71)
Observations	51	50	51	51	51	51	51	51	51	51
R-square	0.99	0.96	0.77	0.90	0.99	0.97	0.87	0.83	0.97	0.85

Appendix 4B (Continued): Estimated values of Time preference rates for LFIs (Method: 2SLS)

	Nigeria	Panama	Paraguay	Senegal	Sri Lanka	Syrian Arab Republic	Togo	Tunisia	Uruguay
Variables	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**	**Consumption**
Lagged consumption	0.47*** (0.12)	0.57** (0.21)	0.73*** (0.09)	1.01*** (0.06)	0.94*** (0.05)	0.94*** (0.04)	0.66*** (0.13)	0.95*** (0.06)	0.79*** (0.07)
Income	0.45*** (0.12)	0.15* (0.07)	0.06 (0.03)	-0.10 (0.09)	0.06*** (0.02)	-0.18*** (0.05)	-0.08* (0.04)	-0.1*** (0.06)	0.18*** (0.03)
D1	-140.19** (59.38)			67.25*** (22.40)	-92.43 (26.21)			-366.85*** (49.15)	-471.53*** (123.16)
D2	-350.17** (130.59)			49.89* (25.32)					-496.31*** (118.38)
D3									
D4									
D5									
D1*Adjusted trend									
D1*Trend									
D2*Trend									
Trend			9.60** (4.08)						
Adjusted trend	32.50** (12.34)					29.06*** (6.20)		28.33** (10.60)	
Constant	-196.76 (129.06)	560.97 (269.44)	135.53 (96.09)	102.11 (172.87)	19.71 (89.65)	506.01*** (166.84)	311.91*** (99.33)	215.42** (105.21)	58.84 (231.76)
Observations	51	51	51	51	51	50	49	51	51
R-square	0.90	0.93	0.98	0.88	0.96	0.89	0.49	0.99	0.96

Notes: Adjusted trend illustrates the increasing or decreasing pattern in the data of actual per capita consumption. Trend is simply defined as the time trend. D1, D2, D3, D4, D5 are the dummies used in the estimation. They take the value of 1 in case of a change in intercept or break in the data or zero otherwise. D*trend is the interaction term of the respective dummy with the trend. D*T is the interaction term of the respective dummy with the adjusted trend. Standard errors are reported in the parenthesis.*, **, *** shows 10%, 5%, and 1% level of significance respectively. For some countries, dummies identified are not reported as these were not significant. Instrument include lags of income.

Appendix 4C:

F statistics and residual Diagnostics for MFIs

Country	F-Statistics	Normality (Jarque- Bera Test)	LM test	Heteroscedasticity (White Test)
Argentina	1259.85 (0.00)	4.25 (0.11)	11.71 (0.003)	5.95 (0.00)
Brazil	1531.53 (0.00)	0.75 (0.68)	0.78 (0.67)	1.01 (0.44)
Chile	37.251 (0.00)	0.27 (0.87)	1.09 (0.57)	2.43 (0.01)
China	1015.32 (0.00)	0.05 (0.97)	5.46 (0.06)	1.11 (0.38)
Columbia	741.73 (0.00)	7.16 (0.02)	(0.36) (0.83)	2.95 (0.004)
Egypt	5719.70 (0.00)	7.50 (0.02)	5.45 (0.06)	15.40 (0.00)
Hong Kong	4529.59 (0.00)	1.28 (0.52)	7.21 (0.02)	5.25 (0.0001)
India	2439.46 (0.00)	2.97 (0.22)	1.09 (0.57)	1.87 (0.11)
Indonesia	2342.50 (0.00)	1.62 (0.44)	0.23 (0.88)	4.33 (0.0003)
Israel	1588 (0.00)	4.66 (0.09)	1.38 (0.50)	0.45 (0.89)
Republic of Korea	3764 (0.00)	107.12 (0.00)	0.56 (0.75)	11.50 (0.00)
Malaysia	1126.95 (0.00)	58.82 (0.00)	8.32 (0.01)	13.30 (0.00)
Mexico	299.55 (0.00)	2.36 (0.30)	16.52 (0.0003)	2.25 (0.02)
Morocco	168.50 (0.00)	0.70 (0.70)	7.39 (0.02)	7.04 (0.00)
Pakistan	599.83 (0.00)	3.40 (0.18)	1.15 (0.56)	3.63 (0.03)
Peru	844.95 (0.00)	14.12 (0.00)	10.08 (0.006)	1.98 (0.06)
Philippines	1389.30 (0.00)	0.16 (0.92)	13.71 (0.001)	1.63 (0.11)
Singapore	4908.23 (0.00)	17.27 (0.00)	13.44 (0.001)	4.58 (0.001)
South Africa	1204.91 (0.00)	0.01 (0.99)	8.45 (0.01)	2.05 (0.05)
Thailand	1847.70 (0.00)	31.44 (0.00)	0.62 (0.73)	1.30 (0.27)
Turkey	9.37.32 (0.00)	0.74 (0.68)	4.01 (0.13)	2.32 (0.03)
Venezuela	376.26 (0.00)	1.64 (0.43)	4.69 (0.09)	3.08 (0.004)

Appendix 4D:

F statistics and residual Diagnostics for LFIs

Country	F-Statistics	Normality (Jarque- Bera Test)	LM test	Heteroscedasticity (White Test)
Bangladesh	311.87	5.27	2.49	2.37
	(0.00)	(0.07)	(0.28)	(0.05)
Benin	288.32	6.91	4.39	10.37
	(0.00)	(0.03)	(0.11)	(0.00)
Bolivia	1760.95	3.91	0.14	2.58
	(0.00)	(0.14)	(0.92)	(0.02)
Botswana	1614.76	6.28	7.15	5.85
	(0.00)	(0.04)	(0.02)	(0.00)
Burkina Faso	107.61	1.19	0.17	2.32
	(0.00)	(0.55)	(0.91)	(0.02)
Burundi	52.82	2.64	1.06	1.23
	(0.00)	(0.26)	(0.58)	(0.29)
Cameroon	474.96	1.19	0.01	0.49
	(0.00)	(0.54)	(0.99)	(0.87)
Costa Rica	552.13	1.32	10.07	2.83
	(0.00)	(0.51)	(0.006)	(0.01)
Côte d’Ivoire	70.66	2.76	0.70	7.01
	(0.00)	(0.25)	(0.70)	(0.00)
Dominican republic	2462.06	5.34	3.81	1.75
	(0.00)	(0.06)	(0.14)	(0.10)
Ecuador	1824.26	16.97	4.23	2.13
	(0.00)	(0.00)	(0.12)	(0.04)
El Salvador	481.61	1.69	10.98	3.56
	(0.00)	(0.42)	(0.004)	(0.002)
Gabon	83.64	15.66	2.86	2.01
	(0.00)	(0.00)	(0.23)	(0.09)
Ghana	144.84	8.30	0.74	0.60
	(0.00)	(0.01)	(0.68)	(0.78)
Guatemala	2678.54	3.55	2.58	4.56
	(0.00)	(0.16)	(0.27)	(0.00)
Honduras	517.60	4.17	0.75	1.62
	(0.00)	(0.81)	(0.68)	(0.14)
Jamaica	103.95	2.23	0.47	3.40
	(0.00)	(0.32)	(0.78)	(0.004)
Kenya	46.47	1.01	9.12	1.09
	(0.00)	(0.60)	(0.01)	(0.39)
Mauritius	562.68	47.34	0.82	0.50
	(0.00)	(0.00)	(0.66)	(0.90)
Niger	86.93	59.99	7.79	1.56
	(0.00)	(0.00)	(0.02)	(0.15)

Appendix 4D (Continued) F statistics and residual Diagnostics for LFIs

Country	F-Statistics	Normality (Jarque- Bera Test)	LM test	Heteroscedasticity (White Test)
Nigeria	87.09	44.49	19.68	0.97
	(0.00)	(0.00)	(0.000)	(0.50)
Panama	333.39	0.41	0.69	6.87
	(0.000	(0.81)	(0.70)	(0.00)
Paraguay	806.78	3.21	3.38	1.63
	(0.00)	(0.20)	(0.18)	(0.13)
Senegal	89.29	2.28	3.43	1.20
	(0.00)	(0.31)	(0.17)	(0.31)
Sri Lanka	393.50	17.55	0.58	11.71
	(0.00)	(0.00)	(0.74)	(0.00)
Syria	141.17	3.34	7.26	1.10
	(0.00)	(0.18)	(0.02)	(0.38)
Togo	22.42	1.75	2.16	5.98
	(0.00)	(0.41)	(0.33)	(0.00)
Tunisia	1778.13	2.22	2.25	3.79
	(0.00)	(0.32)	(0.32)	(0.00)
Uruguay	273.25	1.54	1.75	0.57
	(0.00)	(0.46)	(0.41)	(0.84)

Appendix 4E:

Number of Dummies corresponding to time periods included in the estimation MFIs

Serial No	Country	No of Dummies	Serial No	Country	No of Dummies
1.	Argentina	D1: 1990-1998 D2: 1999-2002 D3: 2004-2011	18.	Singapore	D1: 1998-1999
2.	Brazil	NA	19.	South Africa	NA
3.	Chile	D1: 1973-1976 D2: 1978-1982 D3: 1983-1986 D4: 1987-1998 D4: 1999-2011	20.	Thailand	D1: 1997-1998 D2: 1999-2011
4.	China	D1: 1988-1990	21.	Turkey	D1: 2003-2008
5.	Columbia	D1: 1981-1984 D2: 1995-2001 D3: 2003-2011	22.	Venezuela	D1: 1972-1979 D2: 2004-2011
6.	Egypt	D1: 1980-1996 D2: 1997-2003			
7.	Hong Kong	D1: 1998-2003			
8.	India	NA			
9.	Indonesia	D1: 1997-1999 D2: 2000-2011			
10.	Israel	NA			
11.	Korea	D1: 1996-2011			
12.	Malaysia	D1: 1978-1985 D2: 1986-1997 D3: 1998-2011			
13.	Mexico	D1: 1982-1995 D2: 1996-2011			
14.	Morocco	D1: 1997-2004 D2: 2005-2011			
15.	Pakistan	NA			
16.	Peru	NA			
17.	Philippines	D1: 1986-1996 D2: 1997-2005 D3: 2006-2011			

Note: NA means no dummy is included in the estimation. D1, D2, D3, D4, D5 are the dummies used in the estimation. They take the value of 1 in case of a change in intercept or break in the data or zero otherwise.

Appendix 4F:

Number of dummies corresponding to time periods included in the estimation LFI

Serial No	Country	No of Dummies	Serial No	Country	No of Dummies
1.	Bangladesh	NA	17.	Jamaica	D1: 1962-1963 D2: 1964-1967 D3: 1968-1972 D4: 1973-1986
2.	Benin	D1: (1980-1982)	18.	Kenya	D1: 1968-1970 D2: 1971-1984 D3: 1985-1996
3.	Bolivia	D1: (1968-1970)	19.	Mauritius	D1: 1982-1996 D2: 1997-2003 D3: 2004-2011
4.	Botswana	D1: 1986-1996 D2: 1997-2003 D3: 2007-2011	20.	Níger	NA
5.	Burkina Faso	D1: 1972-1973 D2: 1993-2011	21.	Nigeria	D1: 1985-1995 D2: 1996-2005
6.	Burundi	D1: 1970-1990 D2: 1991-1995 D3: 1996-2004 D4: 2005-2011	22.	Panamá	NA
7.	Cameroon	NA	23.	Paraguay	NA
8.	Costa Rica	NA	24.	Senegal	D1: 1975-1985 D2: 1986-1994 D3: 1996-2004 D4:2005-2010
9.	Côte d'Ivoire	D1: 1979-1984	25.	Sri Lanka	D1: 1975-1984 D2: 2001-2011
10.	Dominican Republic	NA	26.	Syria	D1: 1976-1994 D2: 1995-2010
11.	Ecuador	D1: 1982-1999 D2: 2000-2011	27.	Togo	NA
12.	El Salvador	NA	28.	Tunisia	D1: 1968-1996 D2: 1997-2005 D3: 2006-2011
13.	Gabon	D1: 1974-1978 D2: 1978-1989	29.	Uruguay	D1: 1982-1985 D2: 1986-1998 D3: 1999-2003 D4: 2004-2011
14.	Ghana	NA			
15.	Guatemala	NA			
16.	Honduras	NA			

Note: NA means no dummy is included in the estimation. D1, D2, D3, D4, D5 are the dummies used in the estimation. They take the value of 1 in case of a change in intercept or break in the data or zero otherwise.

Appendix 5A:

Capital share in output for MFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	0.520	0.646	0.491	0.045	50
Brazil	0.452	0.483	0.429	0.010	50
Chile	0.560	0.564	0.531	0.007	50
China	0.475	0.581	0.453	0.041	50
Columbia	0.494	0.534	0.485	0.015	50
Egypt	0.646	0.667	0.613	0.011	50
Hong Kong	0.504	0.532	0.459	0.021	50
India	0.358	0.535	0.282	0.085	50
Indonesia	0.539	0.559	0.522	0.006	50
Israel	0.414	0.444	0.389	0.009	50
Korea	0.407	0.473	0.339	0.046	50
Malaysia	0.428	0.469	0.337	0.054	50
Mexico	0.583	0.634	0.565	0.024	50
Morocco	0.472	0.519	0.466	0.012	50
Pakistan	0.290	0.350	0.200	0.049	50
Peru	0.530	0.701	0.423	0.108	50
Philippines	0.570	0.628	0.555	0.018	50
Singapore	0.572	0.598	0.509	0.027	50
South Africa	0.419	0.480	0.402	0.028	50
Thailand	0.569	0.642	0.499	0.043	50
Turkey	0.641	0.659	0.567	0.026	50
Venezuela	0.595	0.652	0.548	0.019	50

Source: Calculations based on the labour share in income from PWT 8.

Appendix 5B:

Capital share in Output for LFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.290	0.350	0.200	0.049	50
Benin	0.361	0.397	0.350	0.017	50
Bolivia	0.467	0.549	0.284	0.039	50
Botswana	0.734	0.753	0.625	0.027	50
Burkina Faso	0.359	0.443	0.311	0.031	50
Burundi	0.257	0.407	0.163	0.056	50
Cameroon	0.463	0.497	0.445	0.024	50
Costa Rica	0.382	0.429	0.361	0.017	50
Côte d'Ivoire	0.432	0.545	0.383	0.054	50
Dominic Republic	0.521	0.652	0.491	0.048	50
Ecuador	0.712	0.759	0.676	0.041	50
El Salvador	0.290	0.350	0.200	0.049	50
Gabon	0.632	0.739	0.546	0.066	50
Ghana	0.290	0.350	0.200	0.049	50
Guatemala	0.542	0.578	0.537	0.011	50
Honduras	0.418	0.421	0.395	0.007	50
Jamaica	0.449	0.537	0.367	0.037	50
Kenya	0.281	0.374	0.177	0.060	50
Mauritius	0.503	0.579	0.450	0.032	50
Niger	0.434	0.516	0.353	0.028	50
Nigeria	0.610	0.700	0.476	0.043	50
Panama	0.563	0.615	0.554	0.018	50
Paraguay	0.496	0.521	0.418	0.039	50
Senegal	0.619	0.625	0.581	0.012	50
Sri Lanka	0.241	0.339	0.204	0.045	50
Syria	0.290	0.350	0.200	0.049	50
Togo	0.148	0.148	0.148	0.000	50
Tunisia	0.509	0.562	0.495	0.021	50
Uruguay	0.492	0.569	0.437	0.027	50

Source: Calculations based on the labour share in income from PWT 8.

Appendix 6A:

Depreciation rates for MFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	0.033	0.044	0.027	0.004	50
Brazil	0.032	0.036	0.031	0.001	50
Chile	0.039	0.045	0.032	0.003	50
China	0.030	0.033	0.027	0.001	50
Columbia	0.041	0.055	0.033	0.004	50
Egypt	0.054	0.071	0.040	0.008	50
Hong Kong	0.037	0.045	0.029	0.006	50
India	0.053	0.066	0.038	0.009	50
Indonesia	0.037	0.045	0.030	0.005	50
Israel	0.042	0.046	0.035	0.003	50
Korea	0.041	0.049	0.025	0.008	50
Malaysia	0.047	0.060	0.034	0.008	50
Mexico	0.037	0.043	0.034	0.002	50
Morocco	0.043	0.054	0.034	0.006	50
Pakistan	0.040	0.046	0.031	0.004	50
Peru	0.038	0.047	0.032	0.004	50
Philippines	0.048	0.060	0.037	0.007	50
Singapore	0.043	0.052	0.029	0.007	50
South Africa	0.046	0.052	0.040	0.003	50
Thailand	0.048	0.061	0.031	0.009	50
Turkey	0.048	0.055	0.038	0.005	50
Venezuela	0.033	0.038	0.030	0.002	50

Source: PWT 8

Appendix 6B:

Depreciation rates for LFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.038	0.046	0.032	0.004	50
Benin	0.035	0.046	0.028	0.006	50
Bolivia	0.042	0.081	0.035	0.009	50
Botswana	0.050	0.068	0.034	0.012	50
Burkina Faso	0.036	0.039	0.032	0.002	50
Burundi	0.028	0.037	0.024	0.003	50
Cameroon	0.043	0.048	0.035	0.004	50
Costa Rica	0.046	0.051	0.037	0.004	50
Côte d'Ivoire	0.041	0.050	0.033	0.004	50
Dominic Republic	0.034	0.039	0.029	0.003	50
Ecuador	0.037	0.044	0.024	0.004	50
El Salvador	0.043	0.058	0.033	0.007	50
Gabon	0.059	0.071	0.032	0.008	50
Ghana	0.047	0.062	0.040	0.005	50
Guatemala	0.044	0.049	0.034	0.004	50
Honduras	0.039	0.058	0.026	0.009	50
Jamaica	0.039	0.042	0.035	0.002	50
Kenya	0.044	0.051	0.037	0.004	50
Mauritius	0.037	0.056	0.025	0.011	50
Niger	0.034	0.039	0.030	0.002	50
Nigeria	0.034	0.052	0.025	0.007	50
Panama	0.047	0.060	0.034	0.006	50
Paraguay	0.044	0.050	0.037	0.003	50
Senegal	0.033	0.041	0.029	0.004	50
Sri Lanka	0.039	0.044	0.032	0.004	50
Syria	0.042	0.049	0.035	0.005	50
Togo	0.034	0.038	0.030	0.002	50
Tunisia	0.045	0.057	0.034	0.007	50
Uruguay	0.037	0.047	0.032	0.004	50

Source: PWT 8.

Appendix 7A:

Productivity growth for MFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	0.976	1.227	0.740	0.101	50
Brazil	1.132	1.478	0.940	0.141	50
Chile	0.957	1.107	0.735	0.103	50
China	0.610	1.172	0.339	0.264	50
Columbia	1.087	1.214	0.973	0.067	50
Egypt	1.099	1.242	0.881	0.101	50
Hong Kong	0.840	1.072	0.617	0.135	50
India	0.802	1.061	0.644	0.119	50
Indonesia	0.984	1.162	0.783	0.101	50
Israel	0.905	1.026	0.557	0.139	50
Korea	0.804	1.033	0.530	0.168	50
Malaysia	0.916	1.051	0.708	0.088	50
Mexico	1.168	1.384	0.916	0.145	50
Morocco	1.036	1.176	0.817	0.071	50
Pakistan	1.020	1.081	0.956	0.027	50
Peru	1.149	1.494	0.776	0.227	50
Philippines	1.171	1.495	0.940	0.204	50
Singapore	0.821	1.027	0.591	0.110	50
South Africa	1.265	1.595	0.962	0.240	50
Thailand	0.819	1.037	0.490	0.152	50
Turkey	0.958	1.052	0.835	0.054	50
Venezuela	1.175	1.602	0.787	0.213	50

Source: PWT 8

Appendix 7B:

Productivity growth for LFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.006	0.070	-0.142	0.036	50
Benin	0.969	1.043	0.905	0.041	31
Bolivia	1.147	1.458	0.950	0.161	50
Botswana	0.952	1.124	0.782	0.084	31
Burkina Faso	1.005	1.192	0.864	0.052	50
Burundi	1.310	1.602	1.000	0.221	31
Cameroon	1.145	1.619	0.878	0.202	50
Costa Rica	1.013	1.164	0.921	0.073	50
Côte d'Ivoire	1.119	1.531	0.924	0.180	50
Dominic Republic	1.066	1.254	0.918	0.085	50
Ecuador	0.939	1.111	0.738	0.108	50
El Salvador	-0.005	0.040	-0.085	0.028	35
Gabon	1.031	1.175	0.830	0.079	31
Ghana	0.005	0.021	-0.017	0.008	50
Guatemala	1.043	1.213	0.903	0.082	50
Honduras	1.153	1.426	0.907	0.166	41
Jamaica	1.169	1.544	0.963	0.172	50
Kenya	1.079	1.281	0.950	0.082	50
Mauritius	0.858	1.048	0.615	0.142	31
Niger	1.170	1.608	0.915	0.233	50
Nigeria	0.003	0.207	-0.199	0.082	50
Panama	1.004	1.094	0.915	0.050	42
Paraguay	1.361	1.849	0.955	0.279	41
Senegal	0.892	1.000	0.767	0.065	50
Sri Lanka	0.759	1.188	0.486	0.203	50
Syria	0.023	0.345	-0.204	0.094	50
Togo	1.297	2.039	0.962	0.277	31
Tunisia	0.844	1.034	0.599	0.123	50
Uruguay	0.998	1.118	0.835	0.072	50

Source: PWT 8

Note: The data on productivity growth is not available for some LFI economies**.** In order to measure welfare gains for these years we take either the average if the productivity growth is less than the base year of 2005 or initial productivity in the starting year if it is higher than the base year.

Appendix 8A:

Observed rates of return for MFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	1.097	1.180	1.057	0.028	50
Brazil	1.109	1.164	1.064	0.027	50
Chile	1.188	1.322	1.088	0.057	50
China	1.116	1.314	1.084	0.040	50
Columbia	1.121	1.194	1.079	0.025	50
Egypt	1.496	2.122	1.197	0.231	50
Hong Kong	1.139	1.181	1.084	0.024	50
India	1.117	1.148	1.096	0.012	50
Indonesia	1.238	1.734	1.107	0.166	50
Israel	1.133	1.203	1.066	0.035	50
Korea	1.125	1.355	1.068	0.049	50
Malaysia	1.097	1.179	1.034	0.034	50
Mexico	1.226	1.331	1.138	0.046	50
Morocco	1.135	1.265	1.051	0.051	50
Pakistan	1.070	1.158	1.005	0.036	50
Peru	1.111	1.172	1.056	0.027	50
Philippines	1.148	1.221	1.090	0.038	50
Singapore	1.113	1.317	1.055	0.049	50
South Africa	1.147	1.209	1.108	0.028	50
Thailand	1.115	1.208	1.060	0.043	50
Turkey	1.388	1.620	1.228	0.110	50
Venezuela	1.186	1.383	1.086	0.049	50

Source: Authors calculations based on PWT 8

Appendix 8B: Observed rates of return for LFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	1.109	1.752	1.034	0.115	50
Benin	1.088	1.177	1.026	0.031	50
Bolivia	1.147	1.265	1.080	0.038	50
Botswana	1.195	1.881	1.036	0.119	50
Burkina Faso	1.161	1.556	1.053	0.129	50
Burundi	1.147	1.586	1.017	0.094	50
Cameroon	1.183	1.297	1.092	0.044	50
Costa Rica	1.176	1.360	1.102	0.044	50
Côte d’Ivoire	1.291	1.737	1.047	0.228	50
Dominic Republic	1.213	1.618	1.117	0.080	50
Ecuador	1.156	1.311	1.091	0.049	50
El Salvador	1.033	1.063	1.004	0.015	50
Gabon	1.167	1.296	1.017	0.080	50
Ghana	1.062	1.154	0.995	0.038	50
Guatemala	1.323	1.471	1.217	0.066	50
Honduras	1.149	1.246	1.079	0.040	50
Jamaica	1.150	1.278	1.059	0.050	50
Kenya	1.106	1.229	1.012	0.049	50
Mauritius	1.131	1.225	1.076	0.036	50
Niger	1.071	1.137	1.015	0.030	50
Nigeria	1.309	1.706	1.087	0.149	50
Panama	1.376	2.245	1.203	0.205	50
Paraguay	1.200	1.498	1.105	0.086	50
Senegal	1.150	1.337	1.076	0.052	50
Sri Lanka	1.048	1.096	1.013	0.018	50
Syria	1.055	1.108	1.015	0.023	50
Togo	1.031	1.171	0.988	0.028	50
Tunisia	1.096	1.382	1.046	0.053	50
Uruguay	1.114	1.238	1.050	0.039	50

Source: Authors calculations based on PWT 8

Appendix 9A:

Capital output ratios for MFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	4.010	5.004	2.493	0.561	50
Brazil	3.305	4.701	2.250	0.642	50
Chile	2.620	4.311	1.571	0.654	50
China	3.439	4.934	1.309	0.743	50
Columbia	3.126	4.603	2.054	0.563	50
Egypt	1.367	2.682	0.555	0.513	50
Hong Kong	2.928	4.464	2.149	0.538	50
India	2.099	3.121	1.657	0.409	50
Indonesia	2.414	3.770	0.698	0.857	50
Israel	2.476	4.012	1.662	0.562	50
Korea	2.594	3.693	0.890	0.635	50
Malaysia	3.149	5.438	1.563	0.944	50
Mexico	2.278	3.274	1.538	0.365	50
Morocco	2.855	5.172	1.556	0.838	50
Pakistan	2.864	5.173	1.751	0.734	50
Peru	3.650	6.000	2.291	0.930	50
Philippines	3.034	4.009	1.996	0.628	50
Singapore	3.861	5.320	1.695	0.774	50
South Africa	2.208	2.981	1.608	0.367	50
Thailand	3.726	5.436	2.301	0.903	50
Turkey	1.555	2.169	0.980	0.355	50
Venezuela	2.855	5.040	1.443	0.694	50

Source: Authors calculations based on PWT 8
Sample: 22 MFI countries

Appendix 9B:

Capital output ratios for LFIs

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	2.682	5.271	0.381	1.369	50
Benin	3.178	6.197	1.667	0.928	50
Bolivia	2.568	3.817	1.258	0.530	50
Botswana	3.604	10.723	0.810	1.960	50
Burkina Faso	2.346	3.425	0.582	0.889	50
Burundi	1.825	4.209	0.407	0.828	50
Cameroon	2.131	3.329	1.334	0.424	50
Costa Rica	1.769	2.455	0.942	0.287	50
Côte d'Ivoire	1.964	4.672	0.635	1.112	50
Dominic Republic	2.274	3.702	0.754	0.602	50
Ecuador	3.886	5.260	2.175	0.808	50
El Salvador	3.968	5.430	2.428	0.903	50
Gabon	3.258	8.403	1.791	1.559	50
Ghana	2.935	5.400	1.462	0.879	50
Guatemala	1.522	2.058	1.037	0.256	50
Honduras	2.301	3.082	1.498	0.415	50
Jamaica	2.556	4.695	1.416	0.741	50
Kenya	2.029	3.587	1.164	0.597	50
Mauritius	3.120	4.818	1.960	0.654	50
Niger	4.488	8.960	2.565	1.487	50
Nigeria	2.298	5.635	0.739	1.340	50
Panama	1.511	2.430	0.431	0.439	50
Paraguay	2.190	3.367	0.962	0.525	50
Senegal	3.604	5.558	1.673	0.851	50
Sri Lanka	2.839	3.999	2.045	0.490	50
Syria	3.148	4.857	1.992	0.738	50
Togo	2.699	7.251	0.715	1.256	50
Tunisia	4.022	5.726	1.295	1.152	50
Uruguay	3.505	5.638	1.741	0.978	50

Source: Authors calculations based on PWT 8

Appendix 10:

Welfare gains for MFIs: Case 1

Country	Mean	Maximum	Minimum	Std. Dev	Observations
Argentina	1.873	2.056	1.617	0.115	50
Brazil	2.005	2.379	1.805	0.175	50
Chile	1.722	1.917	1.432	0.145	50
China	1.508	2.077	1.065	0.270	50
Columbia	1.939	2.038	1.736	0.074	50
Egypt	1.493	1.765	1.032	0.216	50
Hong Kong	1.682	1.871	1.433	0.120	50
India	1.681	1.945	1.534	0.108	50
Indonesia	1.701	2.035	1.096	0.252	50
Israel	1.752	1.941	1.422	0.126	50
Korea	1.677	1.887	1.187	0.197	50
Malaysia	1.823	1.994	1.548	0.129	50
Mexico	1.847	2.151	1.595	0.169	50
Morocco	1.872	2.156	1.575	0.110	50
Pakistan	1.968	2.109	1.807	0.085	50
Peru	2.018	2.424	1.637	0.239	50
Philippines	1.970	2.300	1.729	0.168	50
Singapore	1.710	1.923	1.258	0.150	50
South Africa	2.059	2.422	1.737	0.242	50
Thailand	1.700	1.932	1.362	0.140	50
Turkey	1.479	1.685	1.250	0.121	50
Venezuela	1.918	2.380	1.399	0.240	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010
Sample: 22 MFI countries
Case 1: Computation of time-varying welfare gains with given time preference rate (β)

Appendix 11:

Welfare gains for MFIs: Case 2

	Mean	**Maximum**	**Minimum**	**Std. Dev.**	**Observations**
Argentina	1.873	2.056	1.617	0.115	50
Brazil	2.750	3.262	2.475	0.240	50
Chile	1.836	2.045	1.527	0.155	50
China	1.477	2.034	1.043	0.264	50
Columbia	2.069	2.174	1.852	0.079	50
Egypt	1.477	1.747	1.022	0.214	50
Hong Kong	1.700	1.891	1.448	0.121	50
India	1.717	1.986	1.567	0.110	50
Indonesia	1.737	2.078	1.119	0.258	50
Israel	1.911	2.118	1.551	0.137	50
Korea	1.677	1.887	1.187	0.197	50
Malaysia	1.823	1.994	1.548	0.129	50
Mexico	1.866	2.173	1.612	0.171	50
Morocco	1.891	2.178	1.591	0.111	50
Pakistan	1.929	2.072	1.770	0.078	50
Peru	2.226	2.675	1.806	0.264	50
Philippines	1.950	2.276	1.711	0.166	50
Singapore	1.728	1.943	1.271	0.152	50
South Africa	2.059	2.422	1.737	0.242	50
Thailand	1.736	1.973	1.391	0.143	50
Turkey	1.479	1.685	1.250	0.121	50
Venezuela	1.788	2.218	1.304	0.223	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010. In case 2, we use country-specific time discount factor which is calculated from equation (3.18) as follows:

$$\beta = \frac{1}{(1+r)}$$

r is the real interest rate.

Sample: 22 MFI countries
Case 2: Computation of time-varying welfare gains with time preference rate (β) based on real interest rates

Appendix 12:

Welfare gains for MFIs: Case 3

	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	1.976	2.169	1.706	0.121	50
Brazil	2.212	2.625	1.991	0.193	50
Chile	1.991	2.217	1.656	0.168	50
China	1.880	2.589	1.328	0.336	50
Columbia	2.002	2.103	1.792	0.076	50
Egypt	1.419	1.678	0.981	0.205	50
Hong Kong	1.835	2.042	1.563	0.131	50
India	1.647	1.905	1.503	0.106	50
Indonesia	2.094	2.504	1.348	0.311	50
Israel	2.272	2.518	1.845	0.163	50
Korea	1.940	2.183	1.372	0.228	50
Malaysia	1.842	2.015	1.565	0.130	50
Mexico	1.886	2.196	1.629	0.173	50
Morocco	2.246	2.587	1.889	0.132	50
Pakistan	2.124	2.604	2.224	0.098	50
Peru	2.152	2.586	1.746	0.255	50
Philippines	1.891	2.208	1.660	0.161	50
Singapore	1.747	1.963	1.285	0.153	50
South Africa	2.196	2.583	1.852	0.258	50
Thailand	1.942	2.208	1.557	0.160	50
Turkey	1.945	2.216	1.644	0.159	50
Venezuela	2.273	2.820	1.658	0.284	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010. In case 3, we use country-specific time preference rate which is estimated from equation (3.19) as follows:

$$c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 Y_t + e_t$$

Sample: 22 (MFI economies)

Case 3: Computation of time-varying welfare gains with estimated time preference rate (β)

Appendix 13:

Welfare gains for MFIs: Case 4

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Argentina	1.735	1.909	1.476	0.120	50
Brazil	1.850	2.221	1.629	0.184	50
Chile	1.532	1.738	1.222	0.158	50
China	1.391	1.934	0.906	0.260	50
Columbia	1.769	1.882	1.528	0.080	50
Egypt	1.218	1.532	0.769	0.224	50
Hong Kong	1.525	1.704	1.282	0.107	50
India	1.526	1.764	1.405	0.092	50
Indonesia	1.505	1.868	0.845	0.277	50
Israel	1.589	1.802	1.268	0.120	50
Korea	1.531	1.759	0.999	0.196	50
Malaysia	1.678	1.888	1.400	0.139	50
Mexico	1.619	1.952	1.366	0.171	50
Morocco	1.698	2.039	1.391	0.131	50
Pakistan	1.969	2.116	1.807	0.080	50
Peru	1.854	2.287	1.489	0.234	50
Philippines	1.769	2.073	1.526	0.147	50
Singapore	1.568	1.789	1.068	0.157	50
South Africa	1.853	2.218	1.537	0.233	50
Thailand	1.551	1.800	1.238	0.132	50
Turkey	1.229	1.459	0.979	0.134	50
Venezuela	1.713	2.163	1.165	0.241	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010. In case 4, we use value of substitution parameter $\epsilon < 1$, in order to compute the marginal product of capital. We use $\epsilon = 0.6$ in welfare calculations.
Sample: 22 (MFI economies)
Case 4: Computation of time-varying welfare gains with capital varieties as imperfect substitutes

Appendix 14: Welfare gains for LFIs: Case 1

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.953	1.030	0.558	0.088	50
Benin	1.887	2.014	1.729	0.063	50
Bolivia	1.951	2.266	1.692	0.157	50
Botswana	1.724	1.995	1.094	0.150	50
Burkina Faso	1.819	2.006	1.291	0.181	50
Burundi	2.113	2.503	1.522	0.196	50
Cameroon	1.893	2.332	1.589	0.206	50
Costa Rica	1.786	1.981	1.523	0.108	50
Côte d'Ivoire	1.773	2.483	1.199	0.398	50
Dominic Republic	1.782	2.029	1.349	0.136	50
Ecuador	1.750	2.014	1.574	0.118	50
El Salvador	1.006	1.057	0.898	0.033	50
Gabon	1.824	2.127	1.630	0.147	50
Ghana	0.987	1.049	0.903	0.034	50
Guatemala	1.614	1.888	1.402	0.123	50
Honduras	1.980	2.240	1.752	0.131	50
Jamaica	1.973	2.432	1.611	0.225	50
Kenya	1.963	2.296	1.757	0.139	50
Mauritius	1.713	1.881	1.447	0.133	50
Niger	2.114	2.526	1.802	0.244	50
Nigeria	0.806	1.055	0.658	0.098	50
Panama	1.540	1.784	0.895	0.181	50
Paraguay	2.080	2.685	1.757	0.239	50
Senegal	1.719	1.926	1.378	0.123	50
Sri Lanka	1.747	2.176	1.478	0.191	50
Syria	1.011	1.336	0.775	0.093	50
Togo	2.319	3.132	2.003	0.244	50
Tunisia	1.754	1.894	1.517	0.103	50
Uruguay	1.870	2.064	1.630	0.105	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010
Sample: 29 LFI countries
Case 1: Computation of time-varying welfare gains with given time preference rate (β)

Appendix 15: Welfare gains for LFIs: Case 2

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.984	1.064	0.576	0.091	50
Benin	1.991	2.125	1.824	0.067	50
Bolivia	1.993	2.314	1.728	0.161	50
Botswana	1.724	1.995	1.094	0.150	50
Burkina Faso	1.919	2.116	1.362	0.191	50
Burundi	2.113	2.503	1.522	0.196	50
Cameroon	2.042	2.516	1.714	0.222	50
Costa Rica	1.863	2.067	1.589	0.112	50
Côte d’Ivoire	1.870	2.619	1.265	0.420	50
Dominic Republic	1.922	2.188	1.455	0.146	50
Ecuador	2.126	2.447	1.912	0.144	50
El Salvador	1.006	1.057	0.898	0.033	50
Gabon	1.925	2.244	1.719	0.155	50
Ghana	0.783	0.832	0.716	0.027	50
Guatemala	1.648	1.928	1.431	0.126	50
Honduras	2.089	2.363	1.849	0.138	50
Jamaica	2.015	2.484	1.645	0.230	50
Kenya	2.005	2.344	1.794	0.142	50
Mauritius	1.807	1.984	1.526	0.140	50
Niger	2.230	2.665	1.901	0.258	50
Nigeria	0.759	0.993	0.619	0.092	50
Panama	1.590	1.842	0.923	0.186	50
Paraguay	2.343	3.033	1.984	0.263	50
Senegal	1.814	2.032	1.453	0.130	50
Sri Lanka	1.747	2.176	1.478	0.191	50
Syria	0.961	1.270	0.737	0.089	50
Togo	2.446	3.304	2.113	0.257	50
Tunisia	1.683	1.818	1.457	0.099	50
Uruguay	1.930	2.130	1.683	0.108	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010. In case 2, we use country-specific time discount factor which is calculated from equation (3.18) as follows:

$$\beta = \frac{1}{(1 + r)}$$

r is the real interest rate.

Sample: 29 LFI countries
Case 2: Computation of time-varying welfare gains with time preference rate (β) based on real interest rates

Appendix 16: Welfare gains for LFIs: Case 3

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.973	1.052	0.570	0.090	50
Benin	2.058	2.200	1.887	0.069	50
Bolivia	1.767	2.052	1.532	0.143	50
Botswana	1.881	2.180	1.191	0.164	50
Burkina Faso	6.236	6.878	4.425	0.620	50
Burundi	3.438	4.072	2.476	0.319	50
Cameroon	2.042	2.516	1.714	0.222	50
Costa Rica	1.804	2.002	1.539	0.109	50
Côte d'Ivoire	2.331	3.265	1.577	0.523	50
Dominic Republic	3.639	4.144	2.755	0.277	50
Ecuador	1.909	2.197	1.717	0.129	50
El Salvador	1.238	1.301	1.106	0.040	50
Gabon	2.538	2.959	2.267	0.204	50
Ghana	2.429	2.583	2.223	0.083	50
Guatemala	1.866	2.184	1.621	0.142	50
Honduras	3.018	3.413	2.670	0.199	50
Jamaica	2.339	2.883	1.909	0.267	50
Kenya	2.547	2.978	2.279	0.181	50
Mauritius	2.192	2.407	1.852	0.170	50
Niger	2.505	2.994	2.136	0.290	50
Nigeria	1.647	2.154	1.344	0.199	50
Panama	2.594	3.005	1.507	0.304	50
Paraguay	2.736	3.531	2.310	0.314	50
Senegal	1.634	1.830	1.310	0.117	50
Sri Lanka	1.784	2.223	1.510	0.195	50
Syria	1.032	1.365	0.792	0.095	50
Togo	3.373	4.555	2.913	0.354	50
Tunisia	1.772	1.914	1.533	0.105	50
Uruguay	2.272	2.508	1.981	0.127	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010. In case 3, we use country-specific time preference rate which is estimated from equation (3.19) as follows:

$$c_t = \beta_0 + \beta_1 c_{t-1} + \beta_2 Y_t + e_t$$

Sample: 29 (LFI economies)
Case 3: Computation of time-varying welfare gains with estimated time preference rate (β)

Appendix 17: Welfare gains for LFIs: Case 4

Country	Mean	Maximum	Minimum	Std. Dev.	Observations
Bangladesh	0.883	0.987	0.429	0.106	50
Benin	1.756	1.930	1.545	0.085	50
Bolivia	1.760	2.078	1.481	0.156	50
Botswana	1.528	1.908	0.826	0.180	50
Burkina Faso	1.653	1.885	1.042	0.224	50
Burundi	1.929	2.347	1.210	0.216	50
Cameroon	1.683	2.115	1.378	0.200	50
Costa Rica	1.589	1.805	1.268	0.119	50
Côte d'Ivoire	1.561	2.356	0.922	0.446	50
Dominic Republic	1.575	1.827	1.064	0.151	50
Ecuador	1.578	1.867	1.336	0.127	50
El Salvador	0.959	1.015	0.836	0.039	50
Gabon	1.625	2.023	1.380	0.184	50
Ghana	0.925	1.024	0.810	0.051	50
Guatemala	1.366	1.651	1.135	0.128	50
Honduras	1.788	2.048	1.560	0.122	50
Jamaica	1.785	2.254	1.383	0.240	50
Kenya	1.806	2.207	1.538	0.170	50
Mauritius	1.560	1.767	1.297	0.132	50
Niger	1.986	2.381	1.646	0.244	50
Nigeria	0.695	0.967	0.513	0.114	50
Panama	1.294	1.568	0.647	0.192	50
Paraguay	1.838	2.456	1.416	0.233	50
Senegal	1.559	1.795	1.161	0.142	50
Sri Lanka	1.655	2.065	1.392	0.175	50
Syria	0.953	1.269	0.725	0.092	50
Togo	2.228	3.039	1.888	0.241	50
Tunisia	1.619	1.795	1.260	0.106	50
Uruguay	1.718	1.957	1.451	0.123	50

Note: This table reports welfare gains of international capital flows for the period 1961-2010. In case 4, we use value of substitution parameter $\epsilon < 1$, in order to compute the marginal product of capital. We use $\epsilon = 0.6$ in welfare calculations.
Sample: 20 (LFI economies)
Case 4: Computation of time-varying welfare gains with capital varieties as imperfect substitutes

Appendix 18: Plots of Welfare gains for MFIs (All cases)

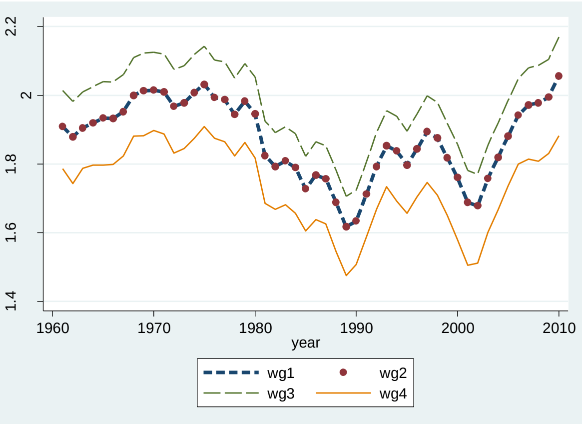


Figure 1: Argentina

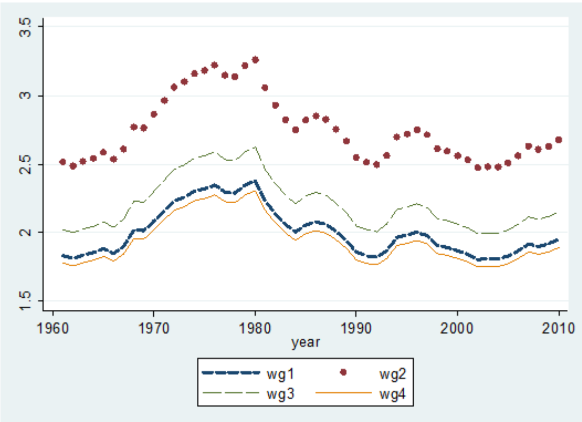


Figure 2: Brazil

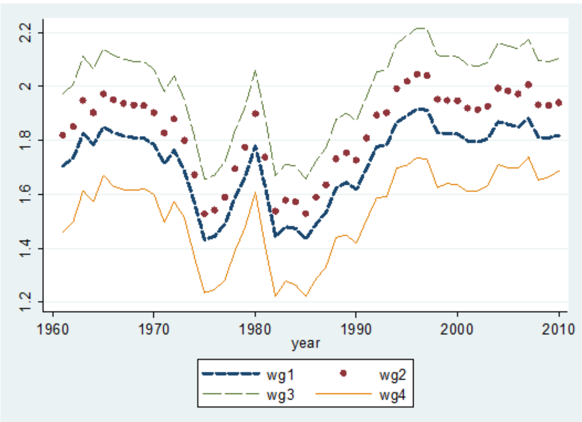


Figure 3: Chile

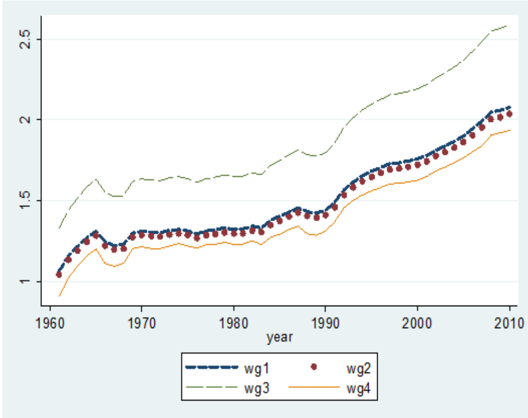


Figure 4: China

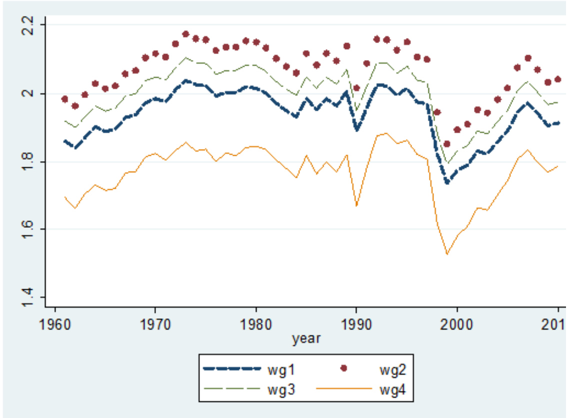


Figure 5: Columbia

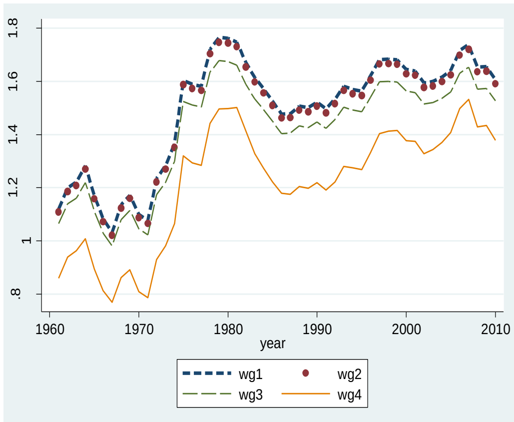


Figure 6: Egypt

Appendix 18 (Continued): Plots of Welfare gains for MFIs (All cases)

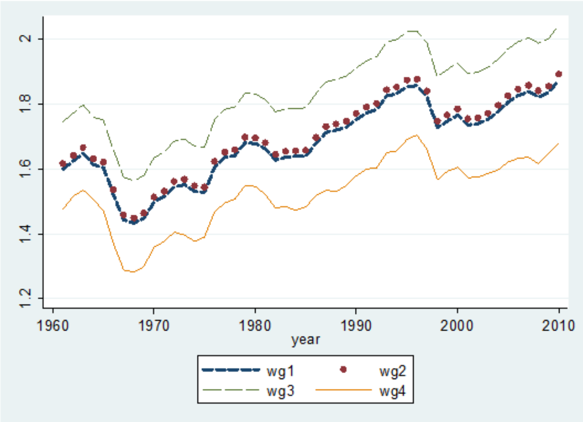


Figure 7: Hong Kong

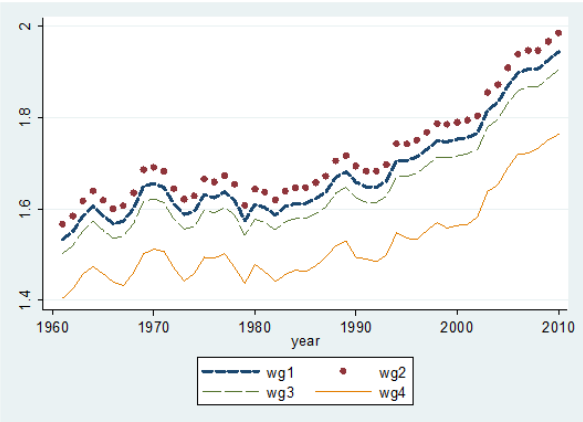


Figure 8: India

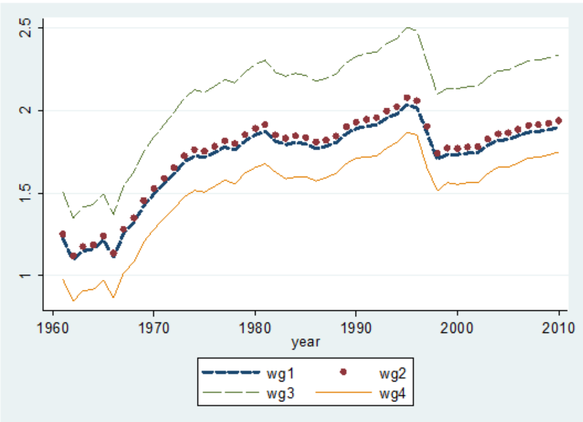


Figure 9: Indonesia

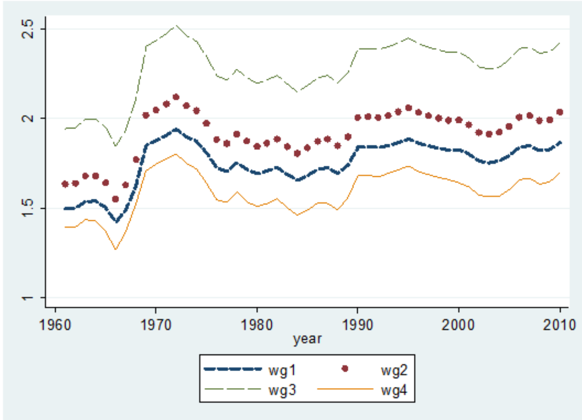


Figure 10: Israel

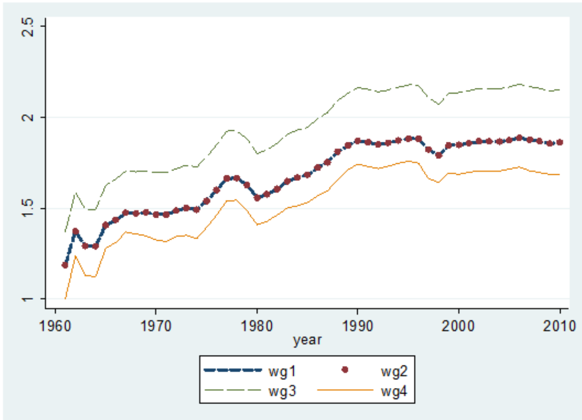


Figure 11: Korea

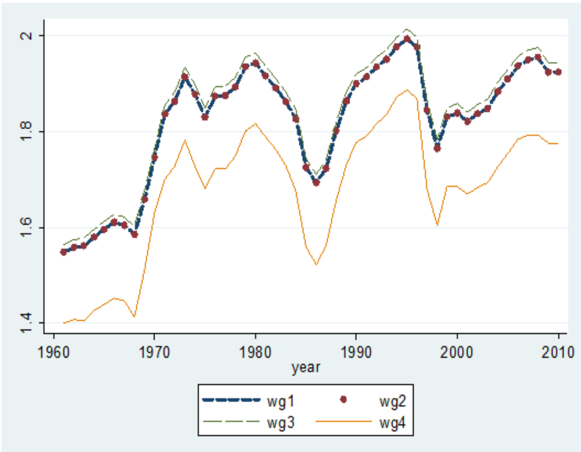


Figure 12: Malaysia

Appendix 18 (Continued): Plots of Welfare gains for MFIs (All cases)

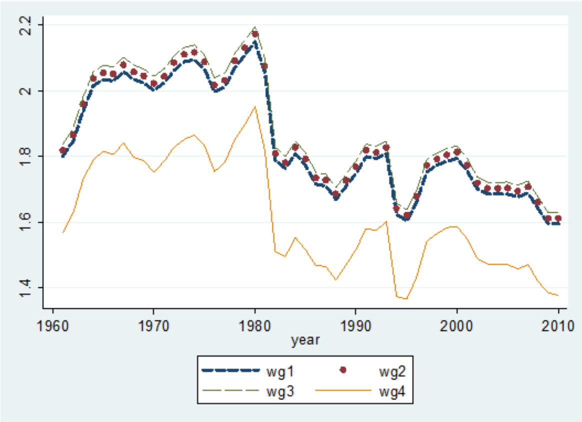


Figure 13: Mexico

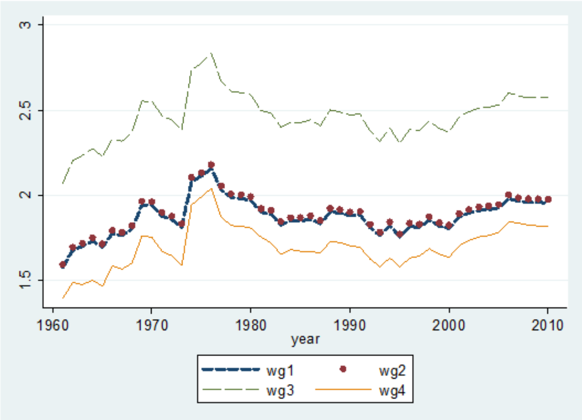


Figure 14: Morocco

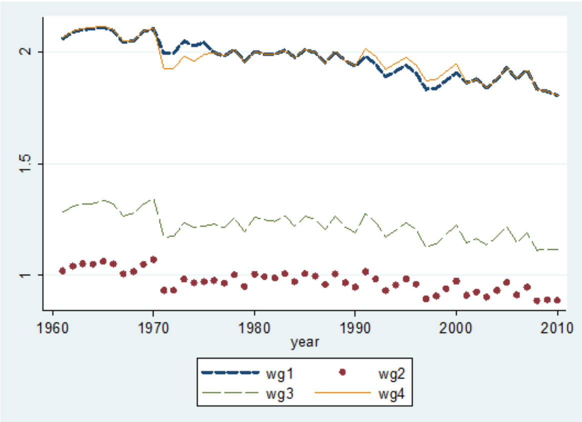


Figure 15: Pakistan

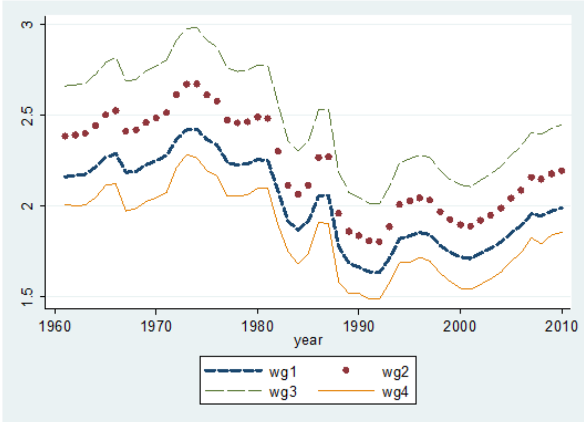


Figure 16: Peru

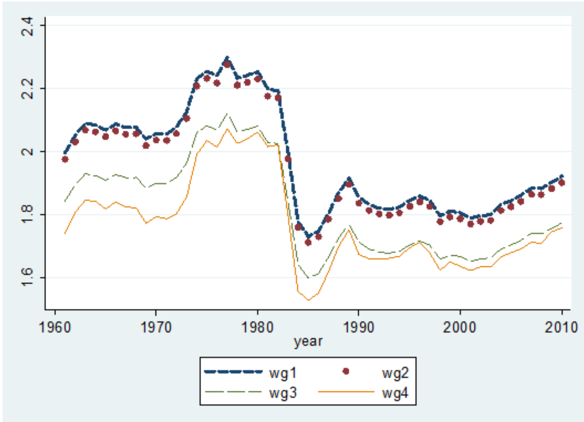


Figure 17: Philippines

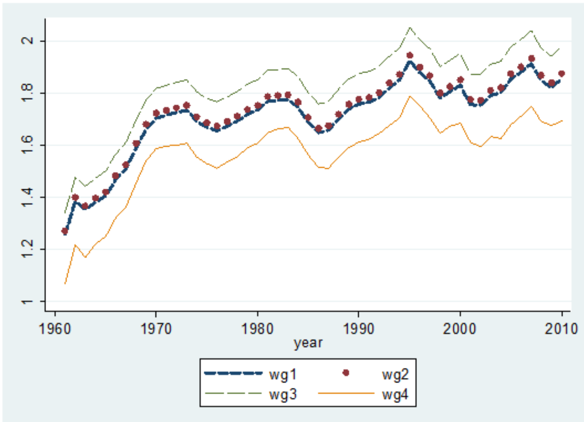


Figure 18: Singapore

Appendix 18 (Continued): Plots of Welfare gains for MFIs (All cases)

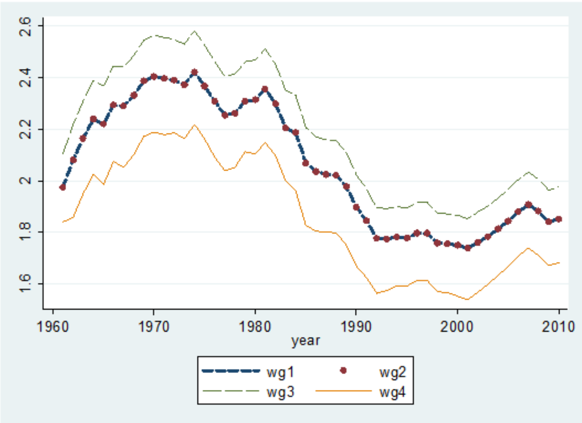


Figure 19: South Africa

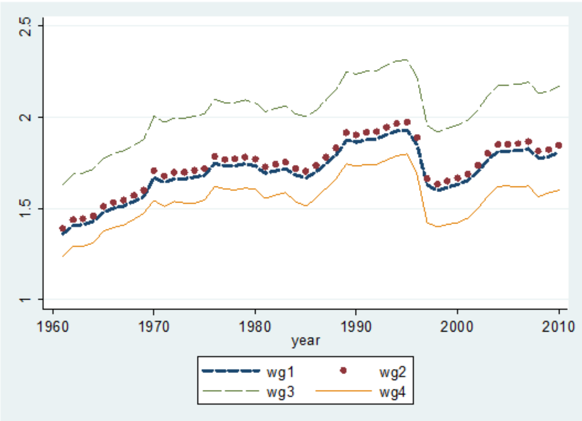


Figure 20: Thailand

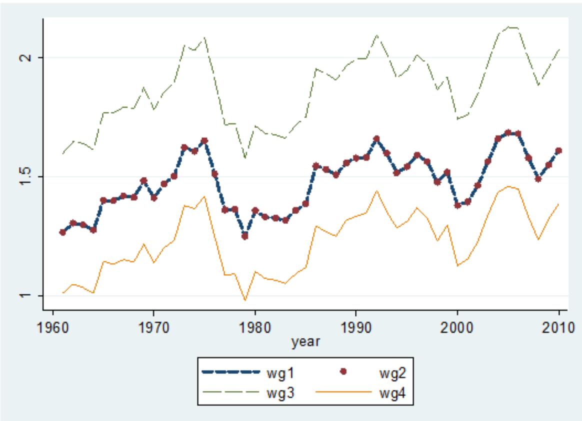


Figure 21: Turkey

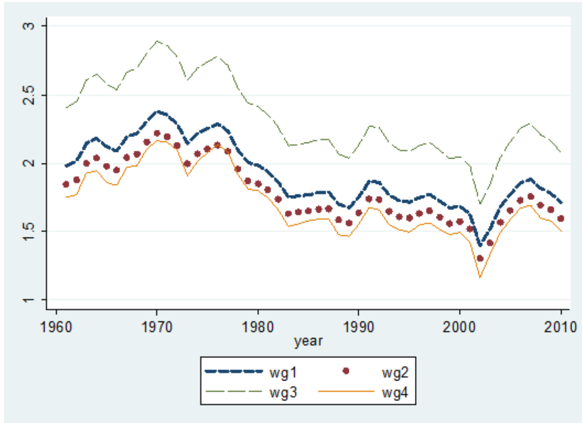


Figure 22: Venezuela

Appendix 19: Plots of welfare gains for LFIs (All cases)

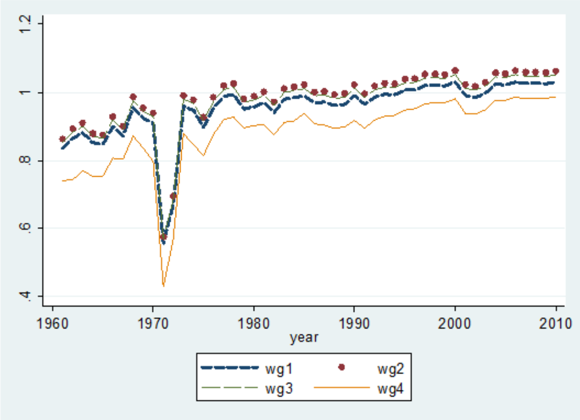


Figure 1: Bangladesh

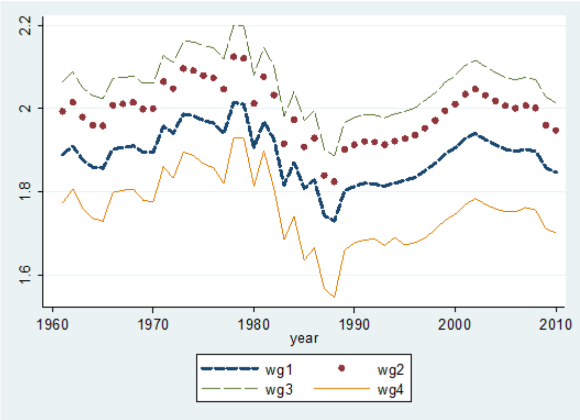


Figure 2: Benin

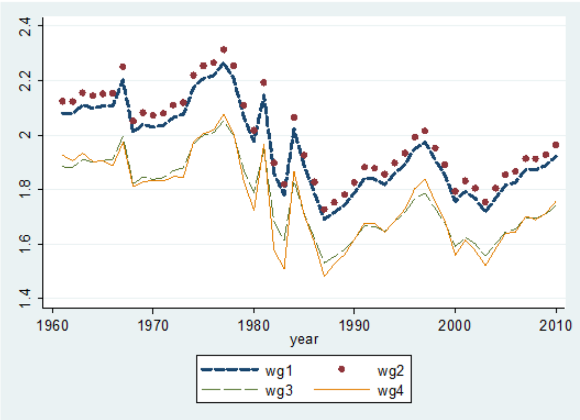


Figure 3: Bolivia

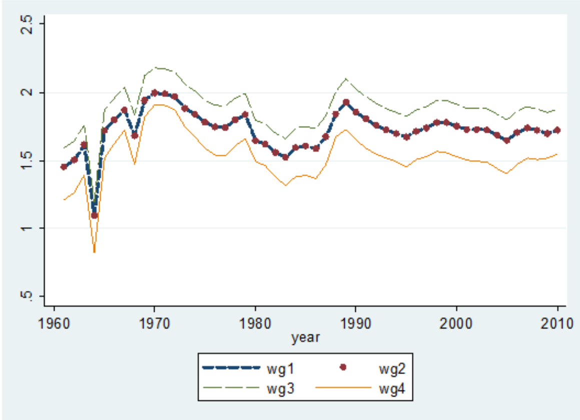


Figure 4: Botswana

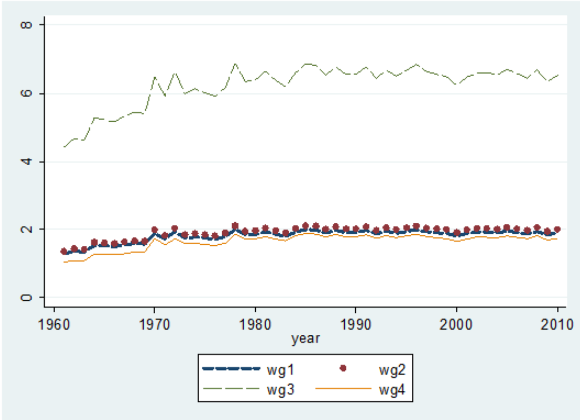


Figure 5: Burkina Faso

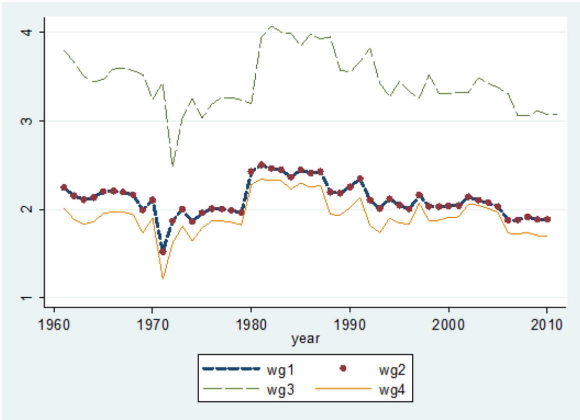


Figure 6: Burundi

Appendix 19 (Continued): Plots of welfare gains for LFIs (All cases)

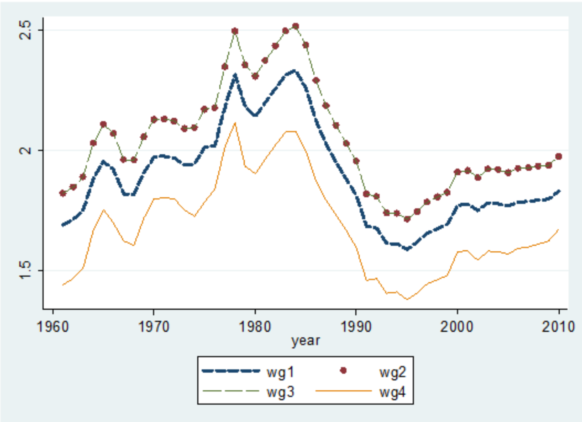


Figure 7: Cameroon

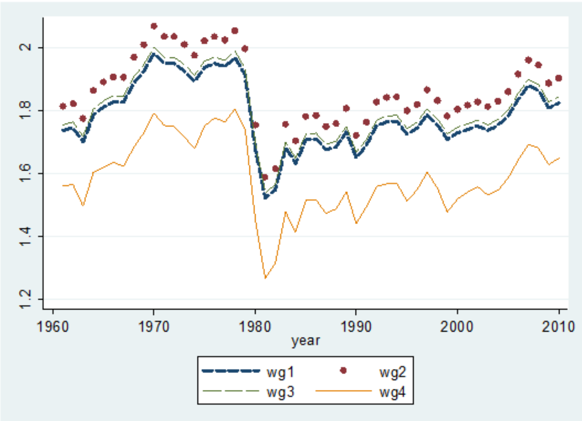


Figure 8: Costa Rica

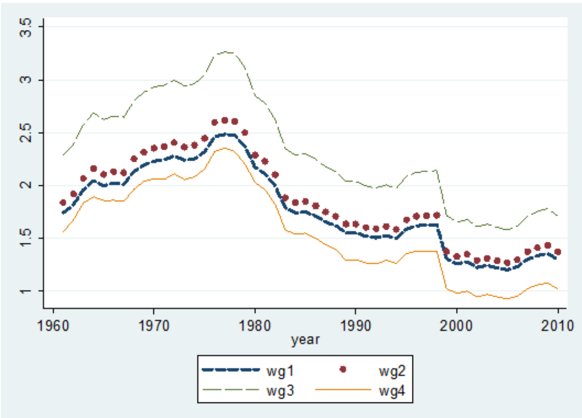


Figure 9: Côte d'Ivoire

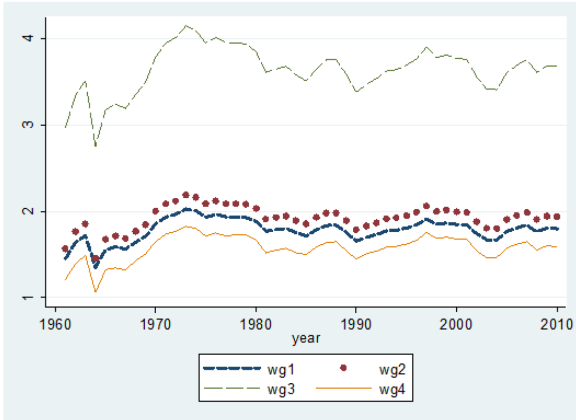


Figure 10: Dominic Republic

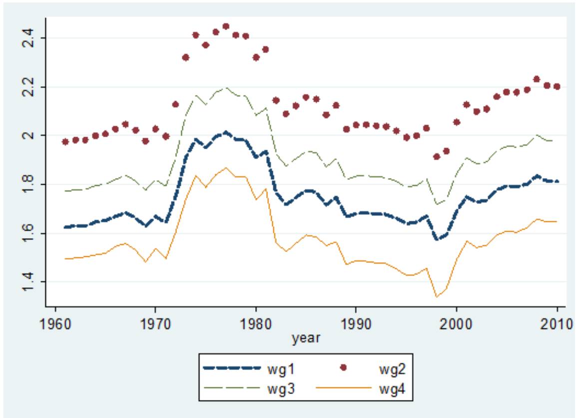


Figure 11 Ecuador

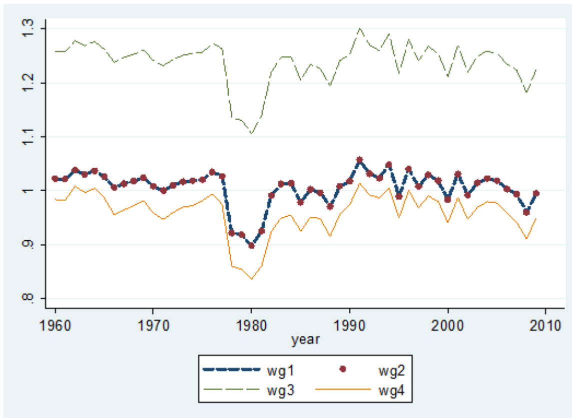


Figure 12: El Salvador

Appendix 19 (Continued) Plots of welfare gains for LFIs (All cases)

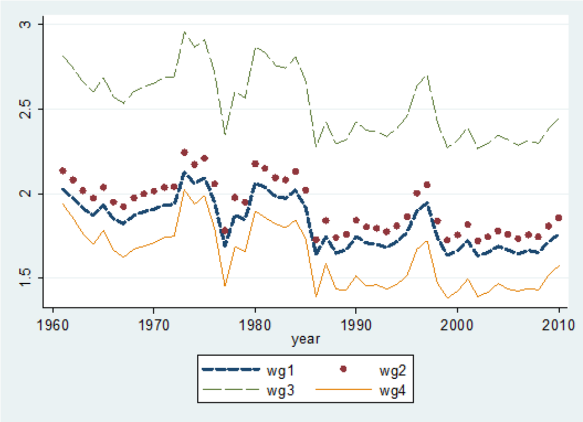


Figure 13: Gabon

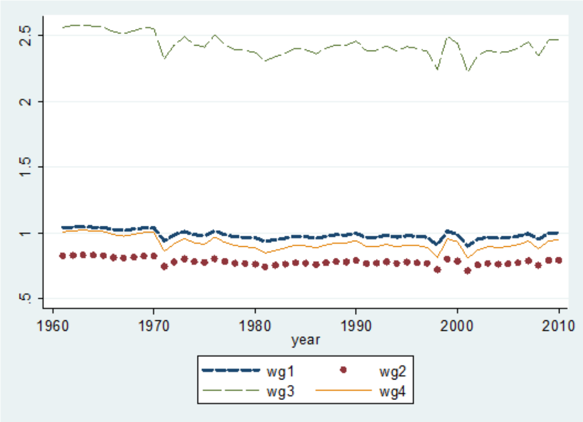


Figure 14: Ghana

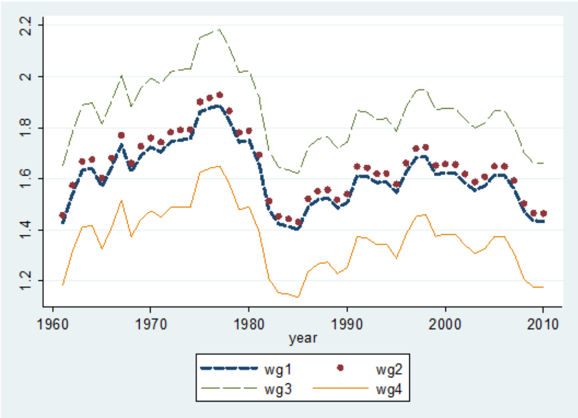


Figure 15: Guatemala

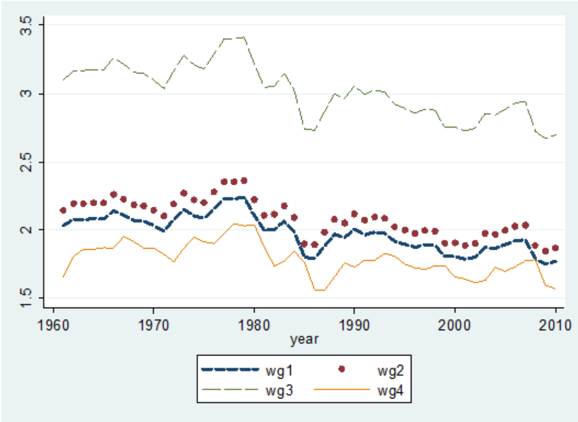


Figure 16: Honduras

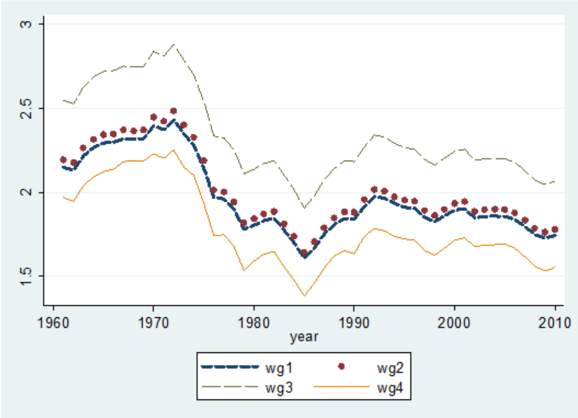


Figure 17: Jamaica

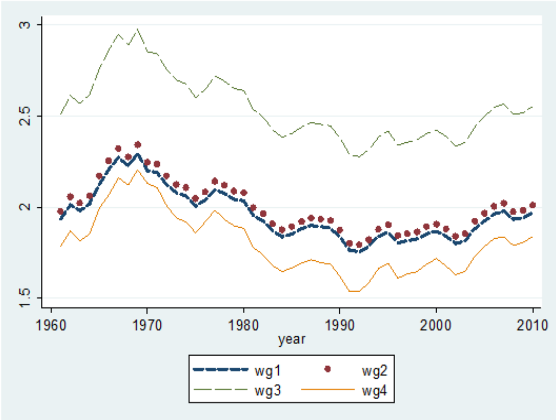


Figure 18: Kenya

Appendix 19 (Continued): Plots of welfare gains for LFIs (All cases)

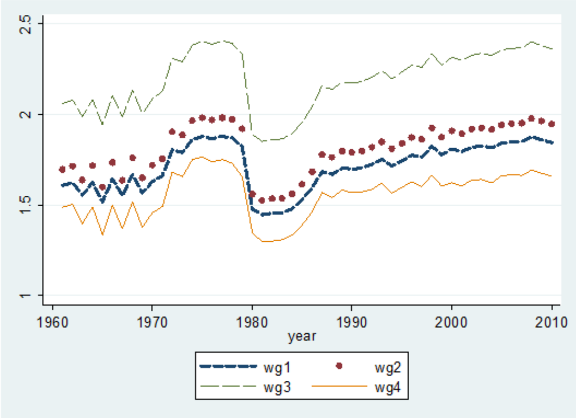


Figure 19: Mauritius

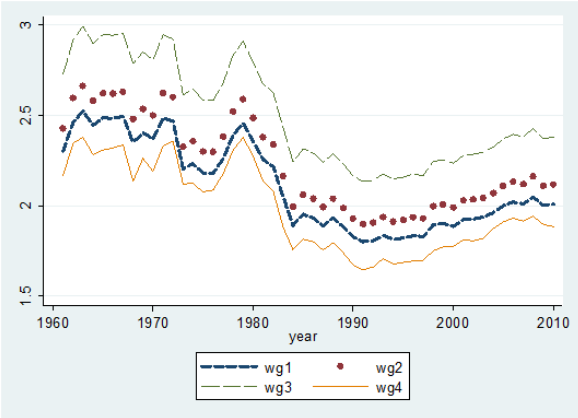


Figure 20: Niger

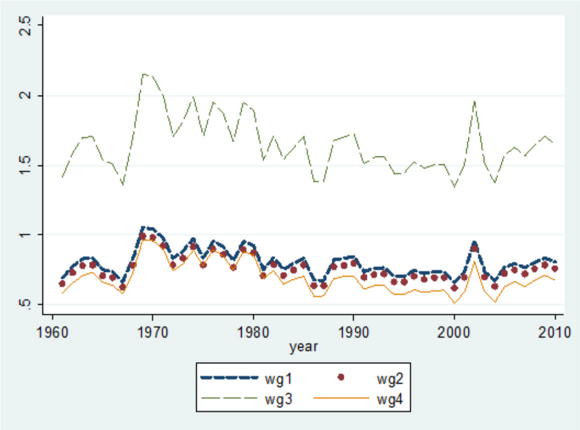


Figure 21: Nigeria

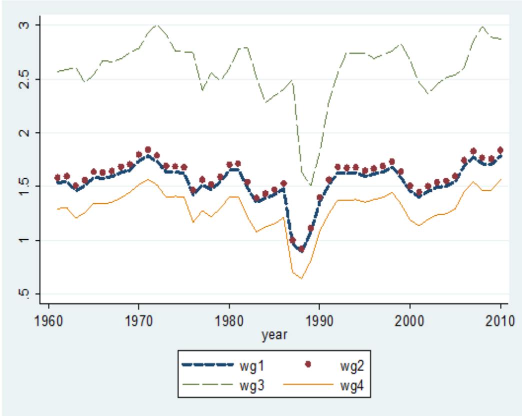


Figure 22: Panama

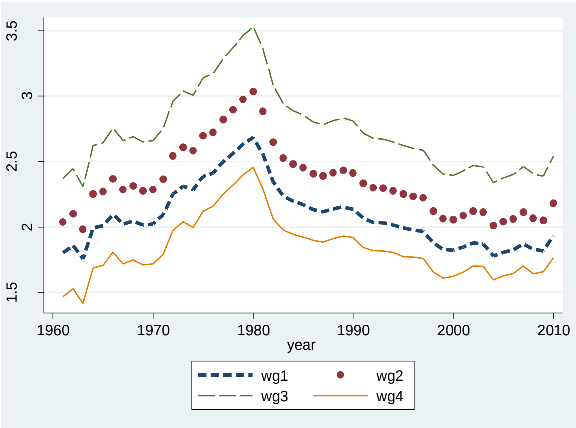


Figure 23: Paraguay

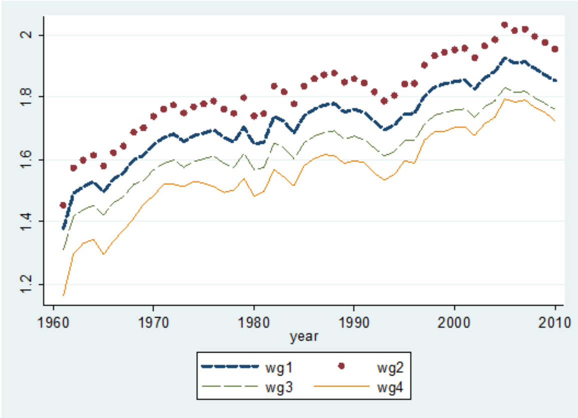


Figure 24: Senegal

Appendix 19 (Continued): Plots of welfare gains for LFIs (All cases)

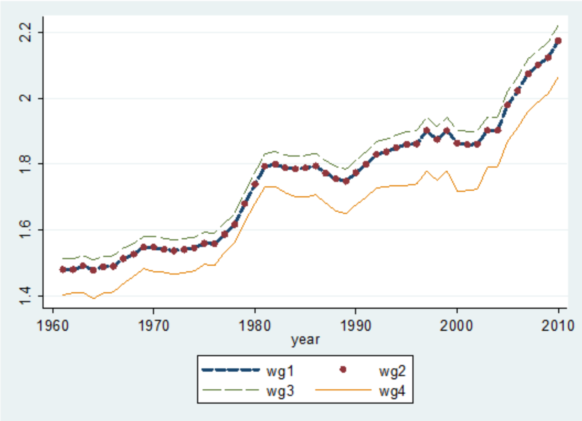


Figure25: Sri Lanka

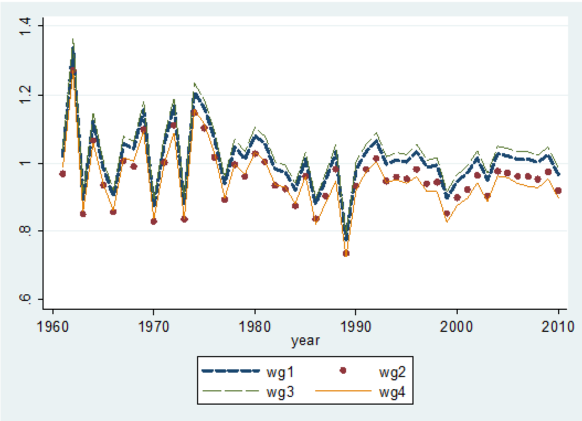


Figure 26: Syria

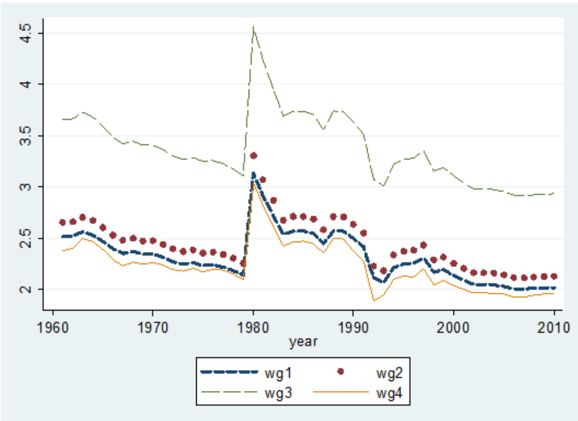


Figure 27: Togo

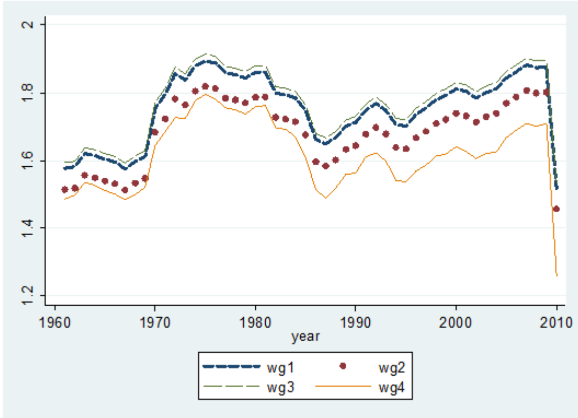


Figure 28: Tunisia

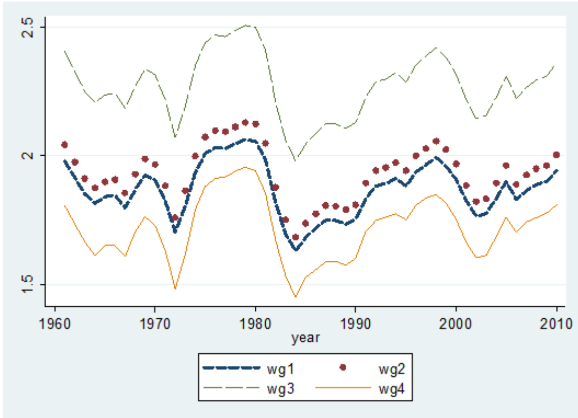
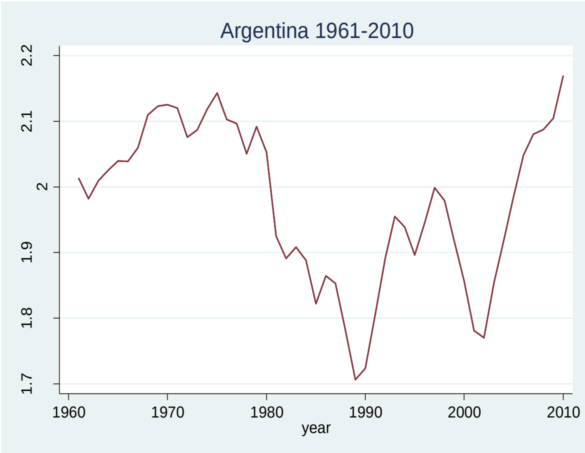
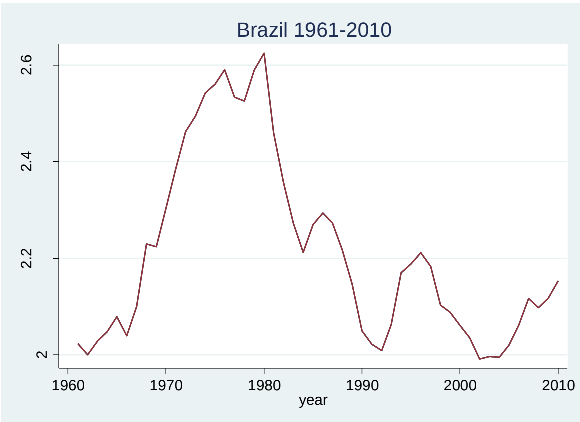
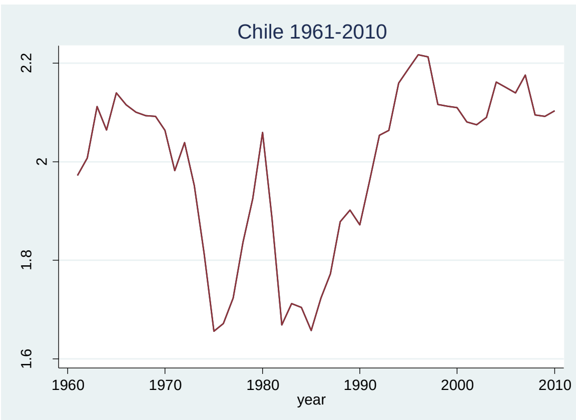


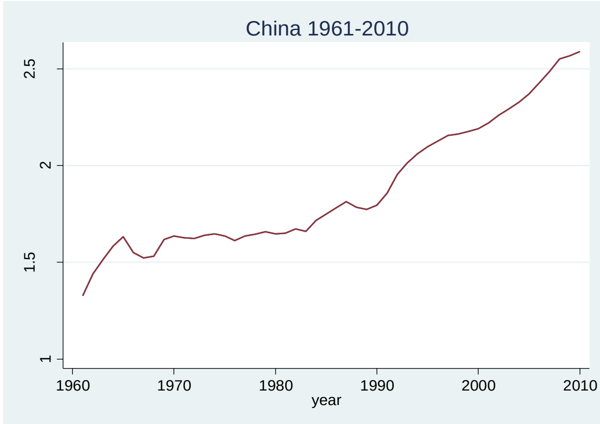
Figure 29: Uruguay

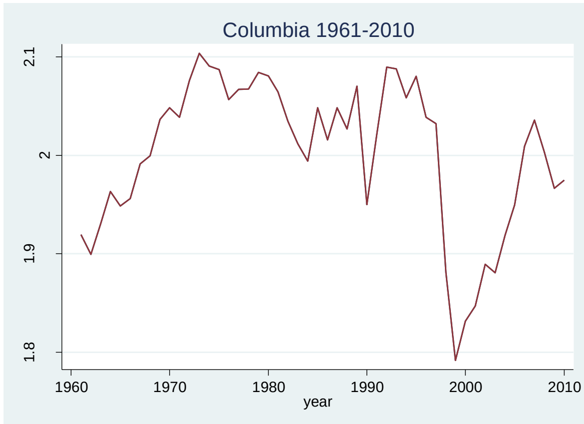
Appendix 20: Plots of time series of welfare gains for MFIs (Case 3)

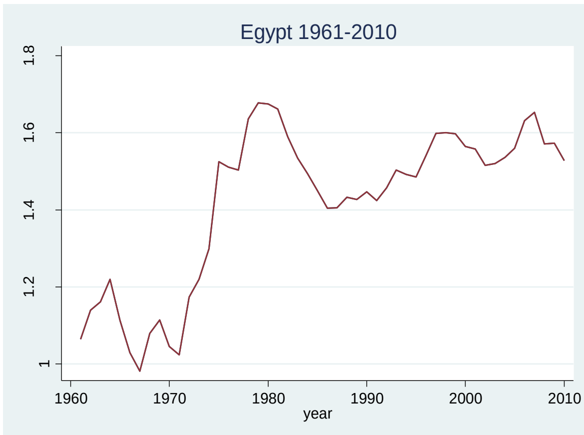




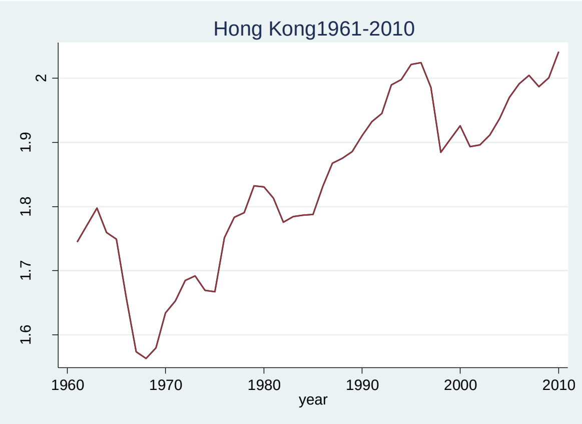


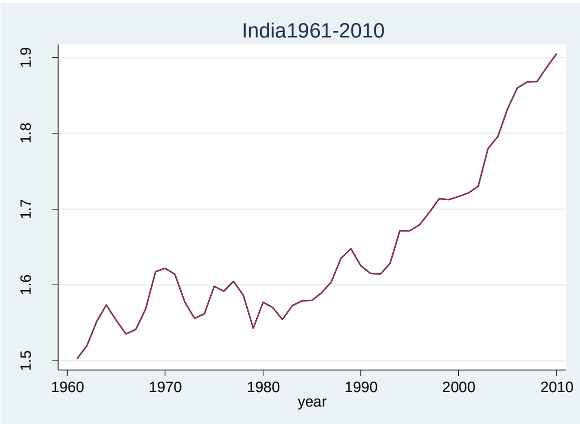


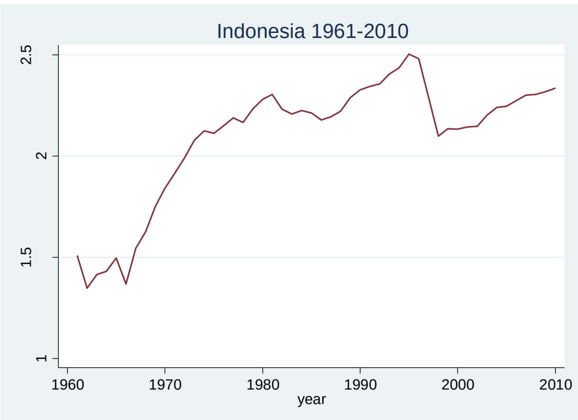


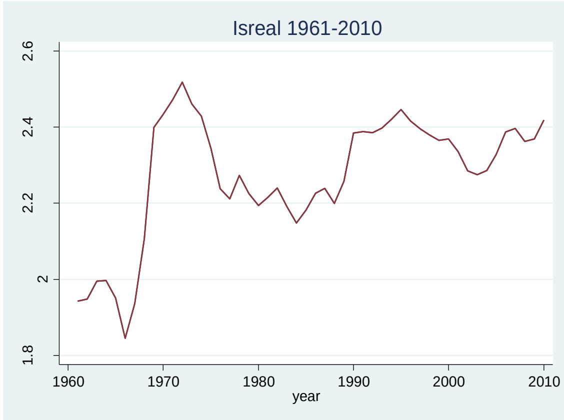


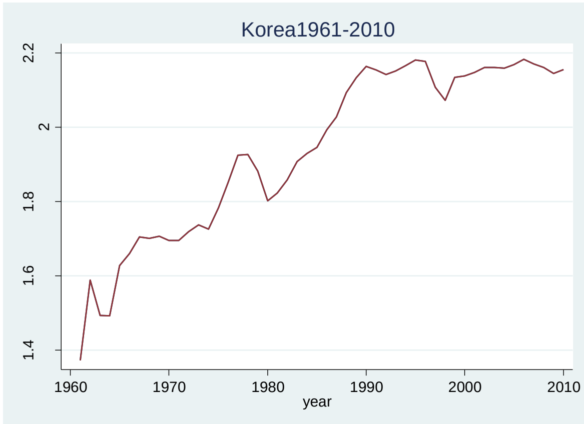
Appendix 20 (Continued): Plots of time series of welfare gains for MFIs (Case 3)

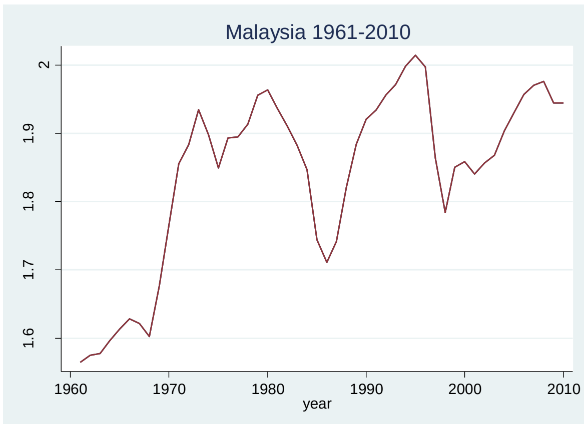




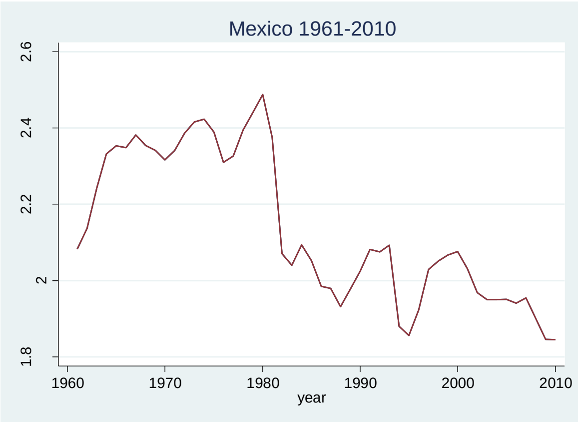


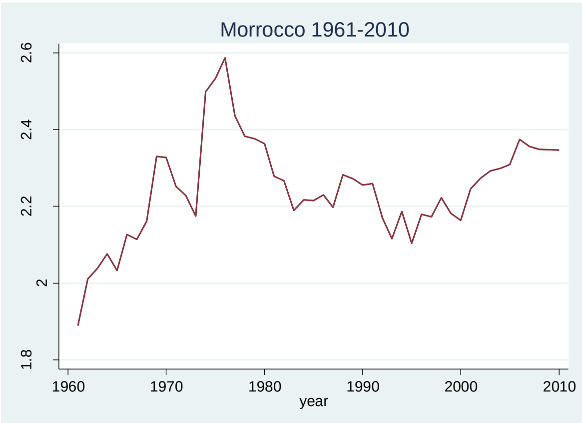


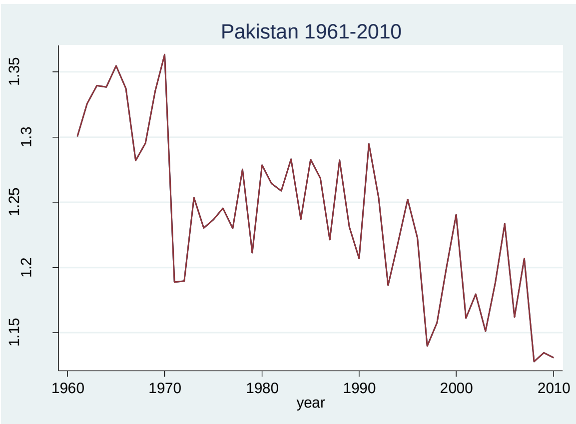


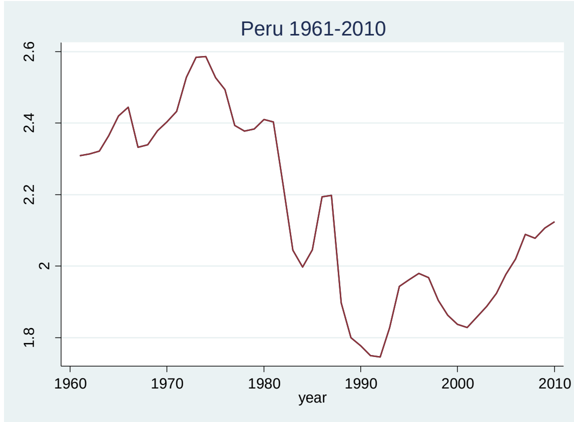


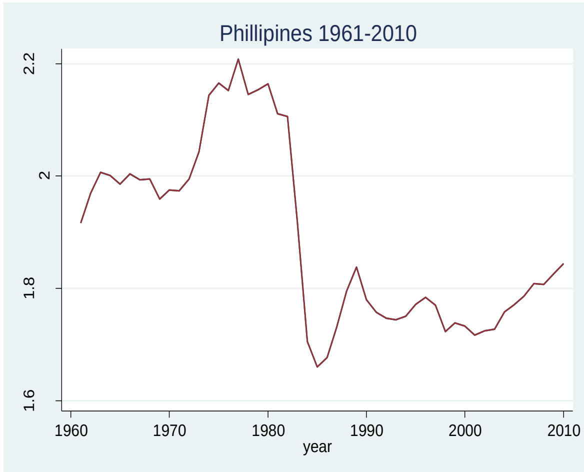
Appendix 20 (Continued): Plots of time series of welfare gains for MFIs (Case 3)

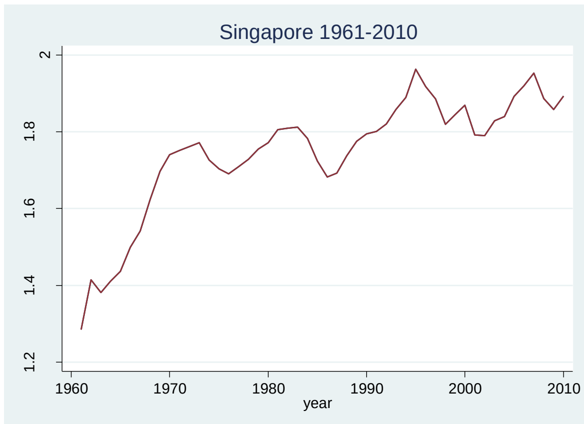




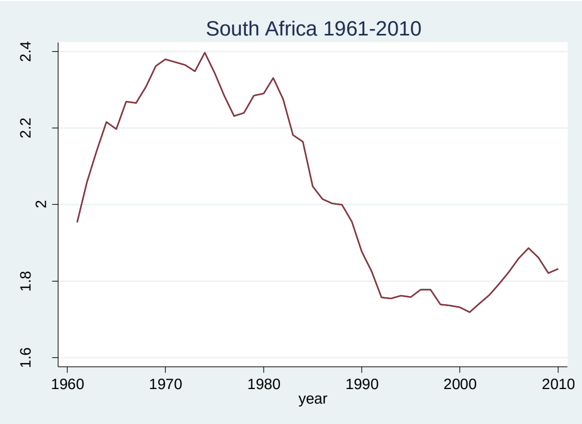


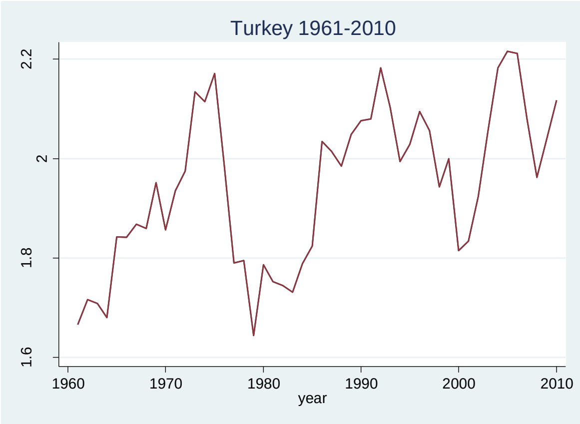


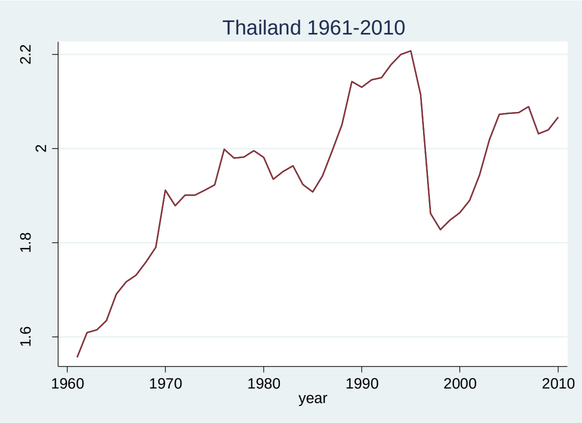


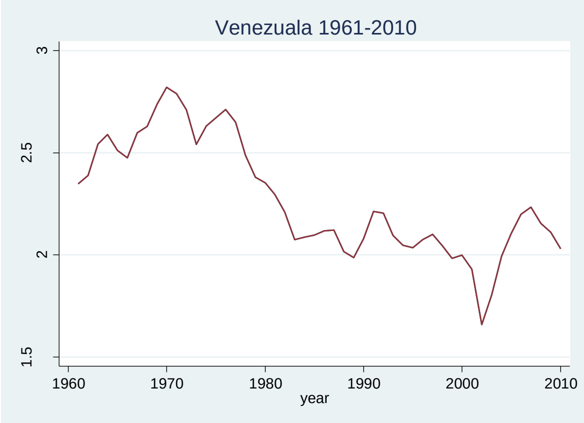


Appendix 20 (Continued): Plots of time series of welfare gains for MFIs (Case 3)

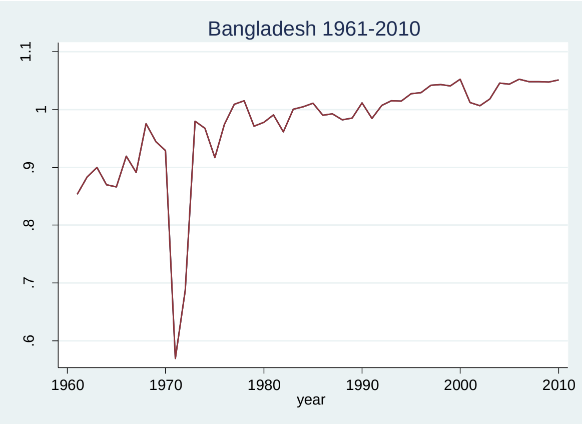


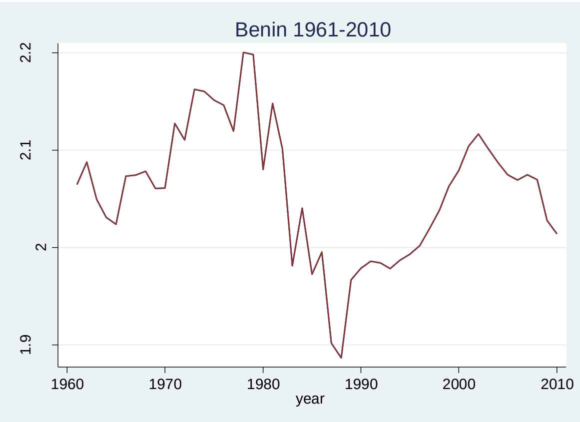


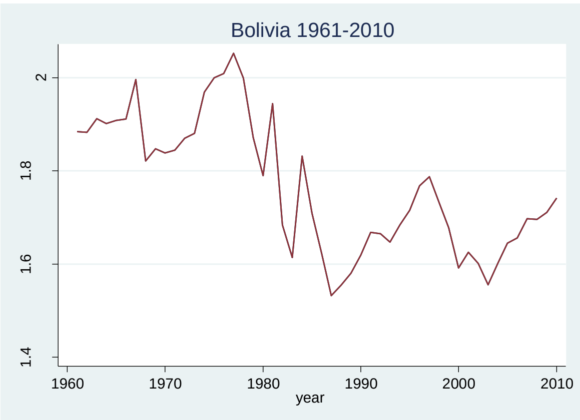


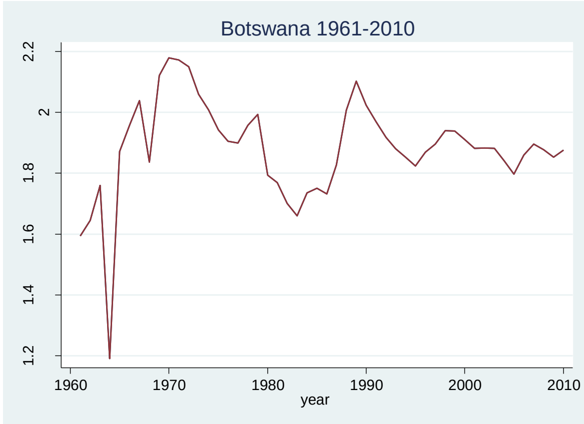


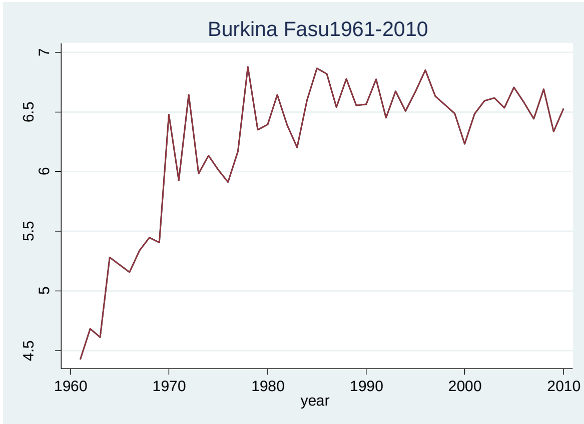
Appendix 21: Plots of time series of welfare gains LFIs (Case 3)

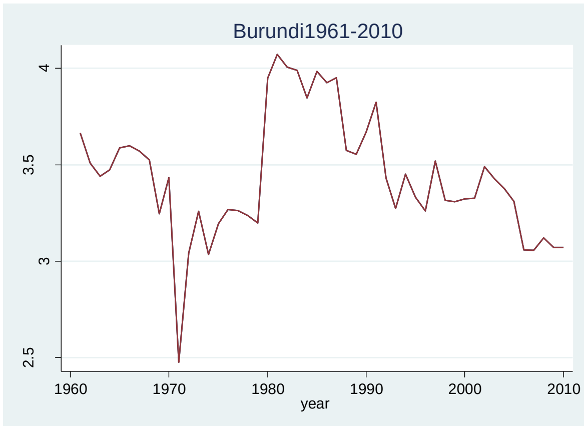




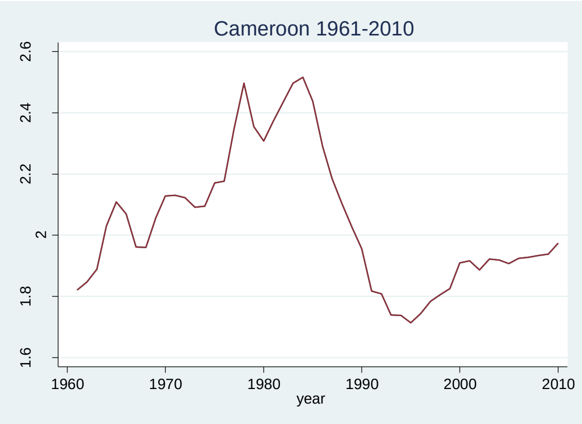


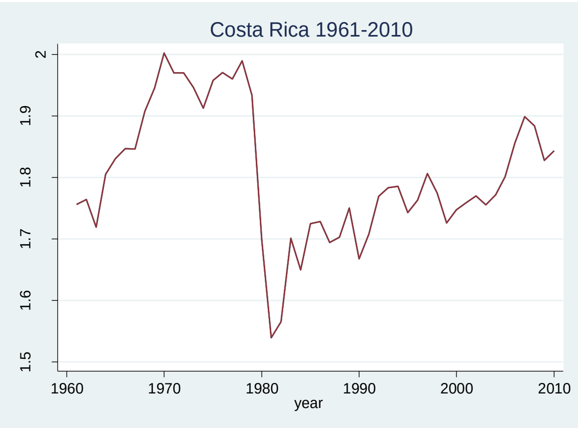


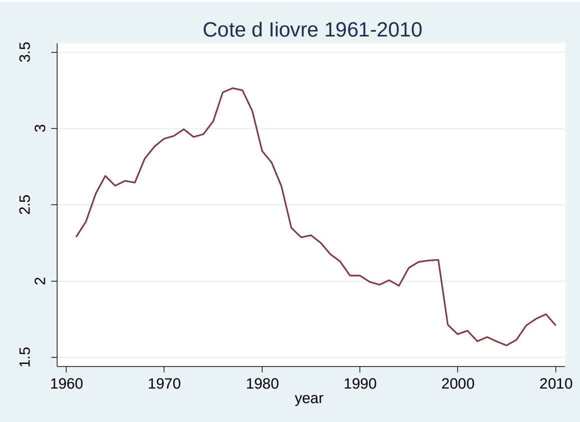


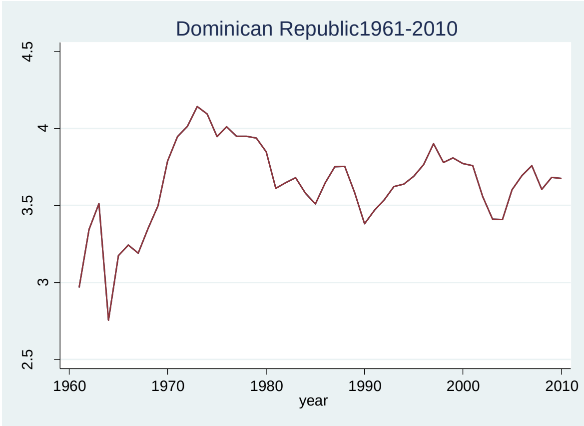


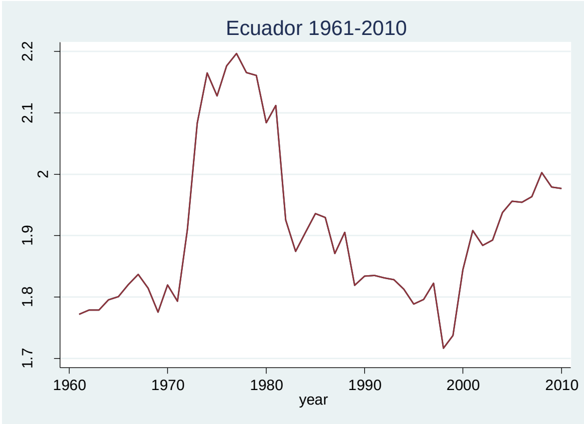
Appendix 21(Continued): Plots of time series of welfare gains LFIs (Case 3)

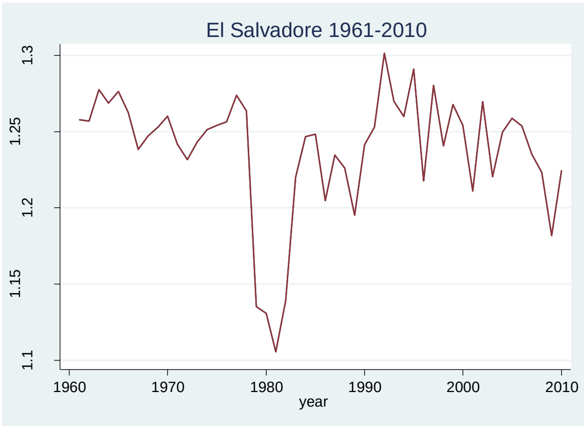




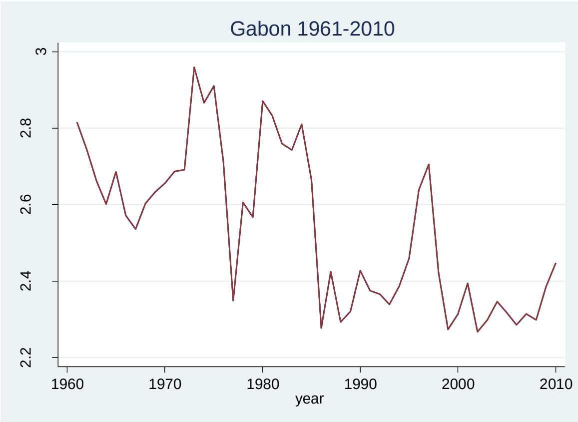


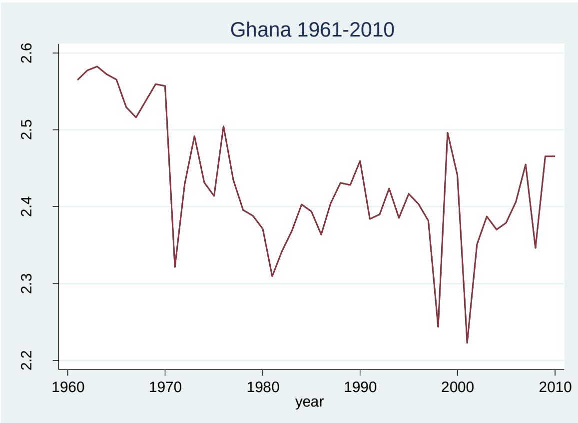


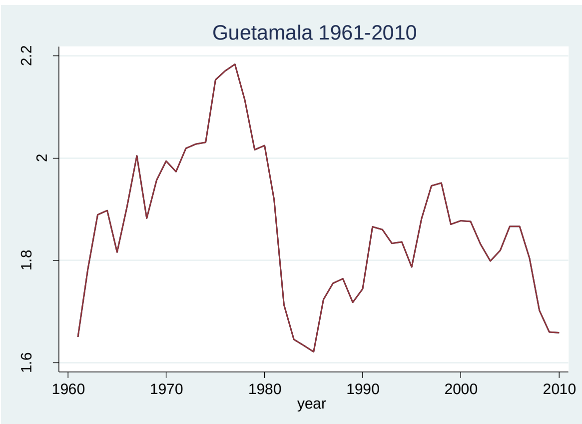


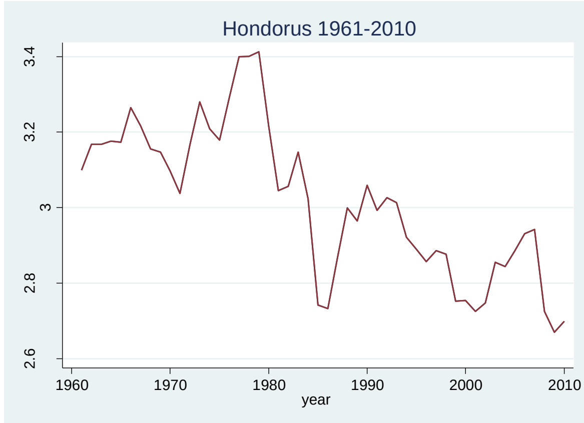


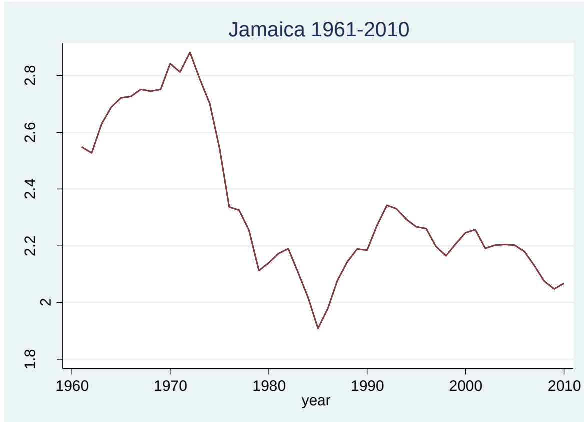
Appendix 21(Continued): Plots of time series of welfare gains LFIs (Case 3)

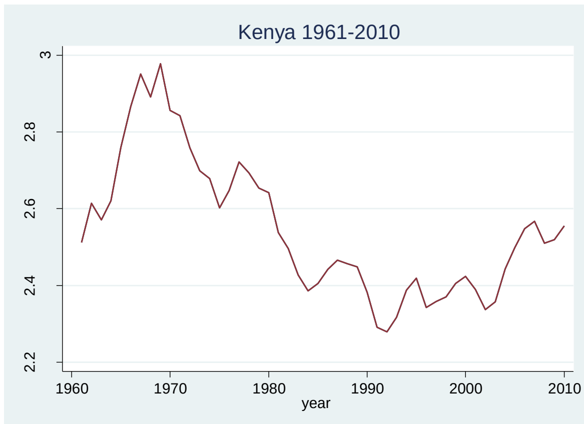




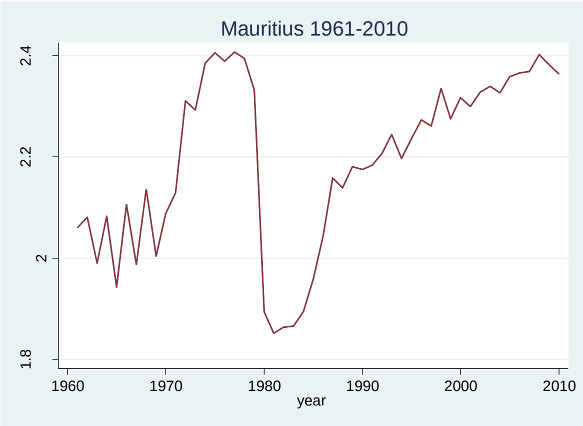


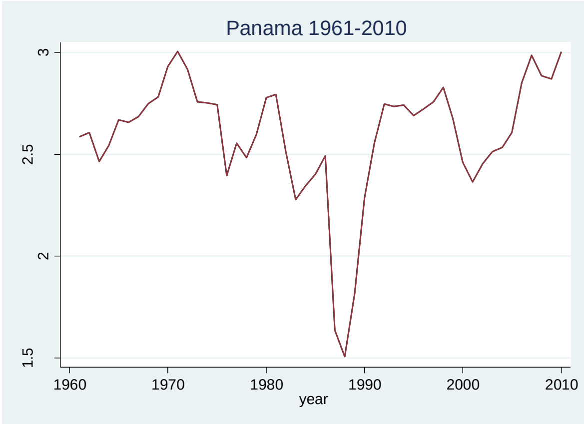


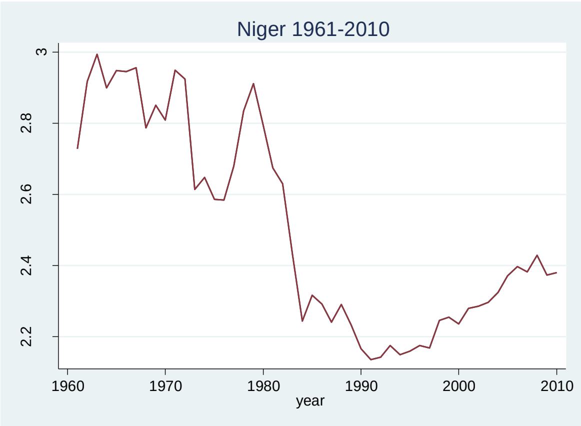


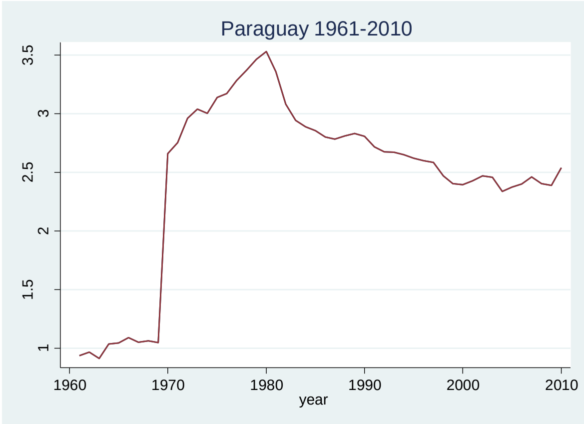


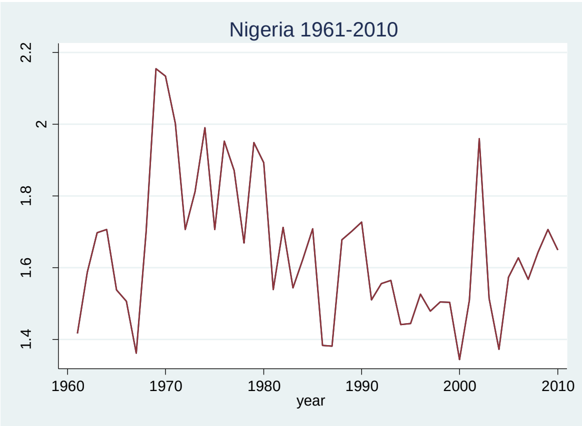
Appendix 21 (Continued): Plots of time series of welfare gains LFIs (Case 3)

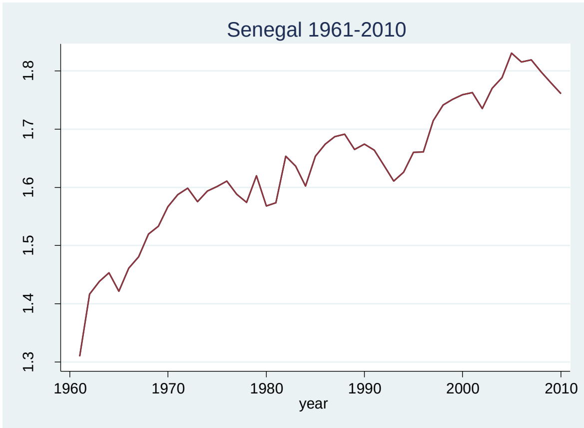




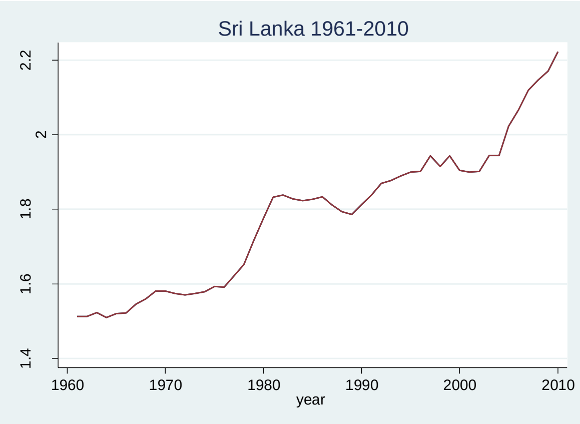


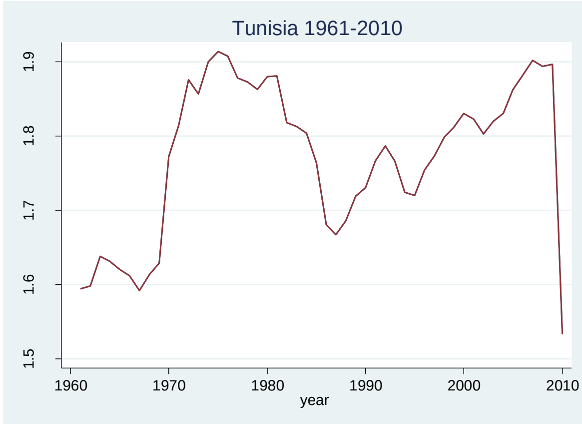


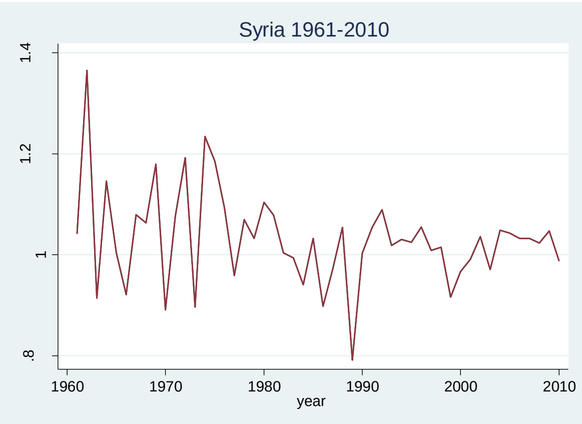


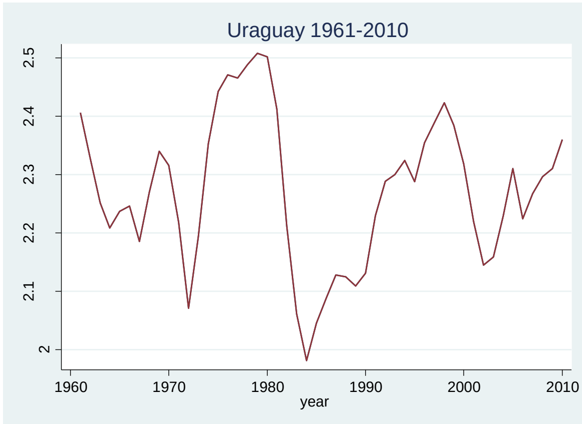


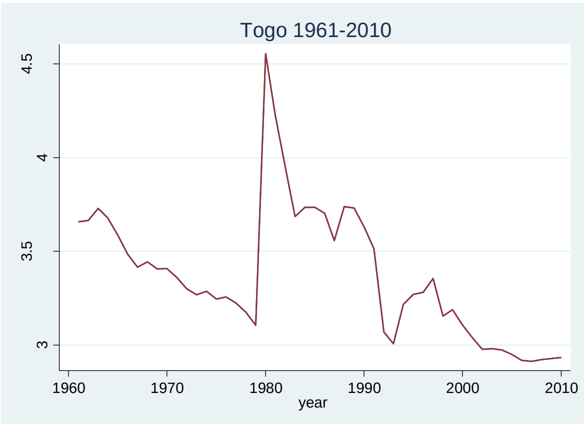
Appendix 21(Continued): Plots of time series of welfare gains LFIs (Case 3)



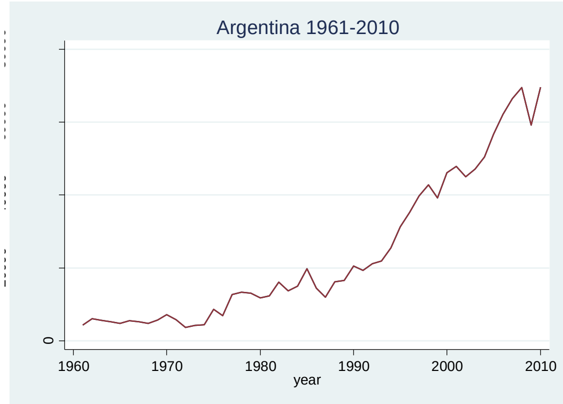


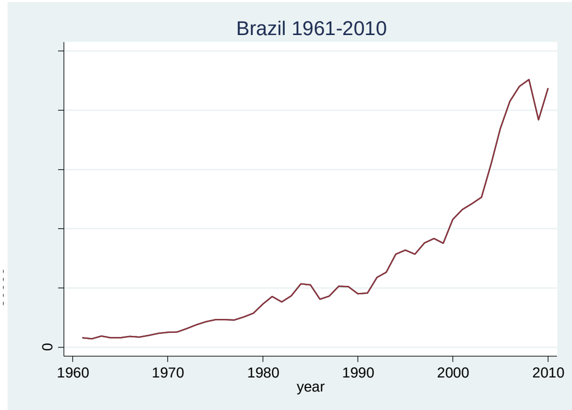


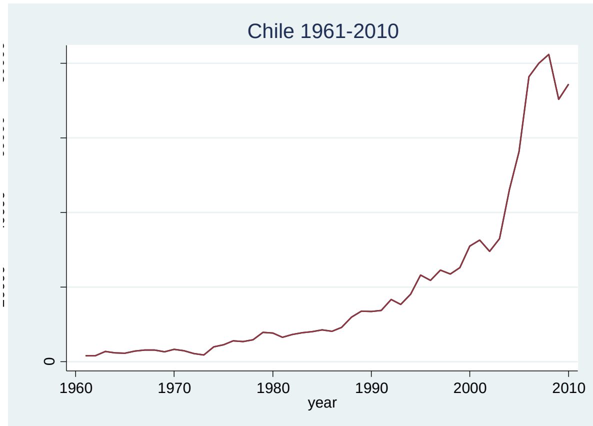


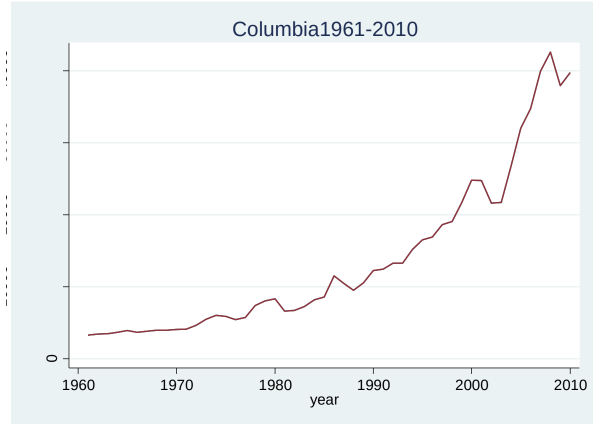


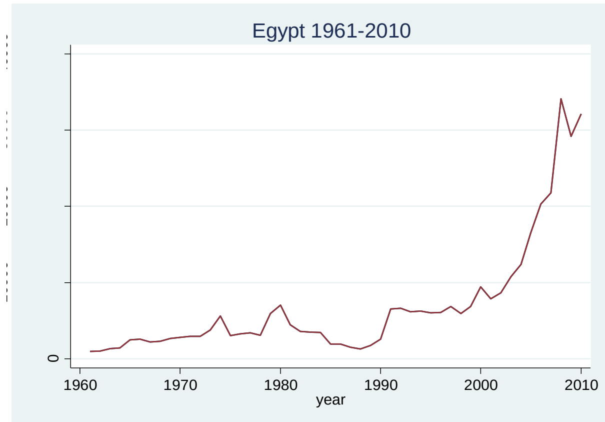
Appendix 22: Plots of time series of exports for MFIs



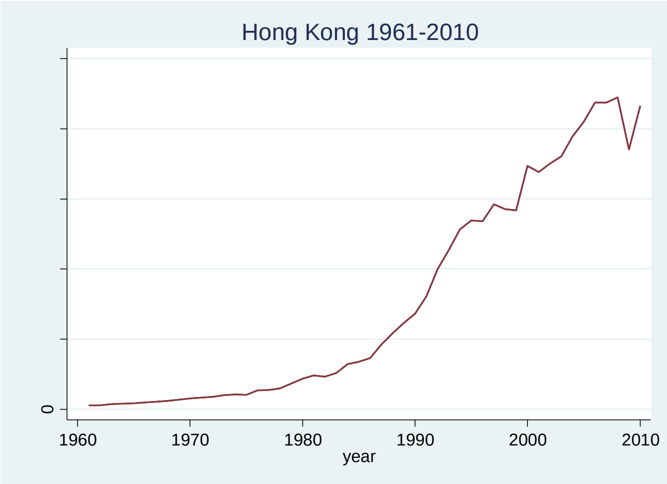


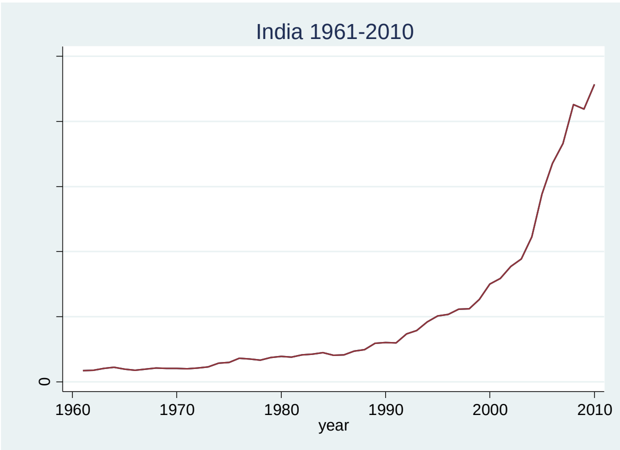


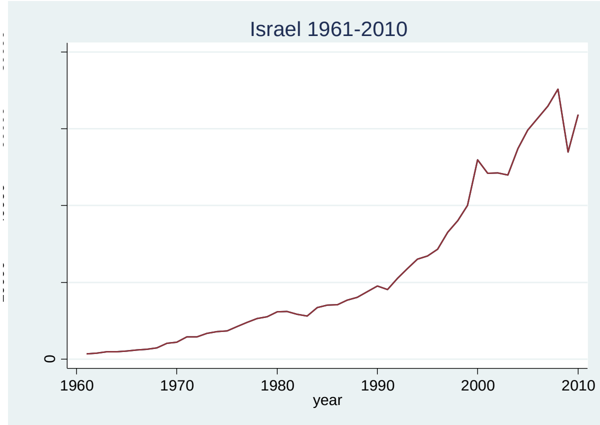


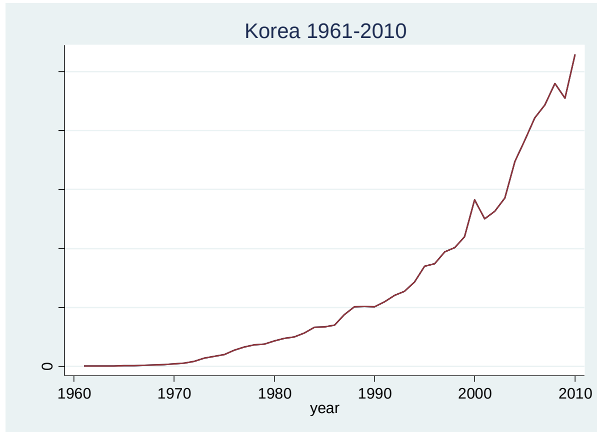


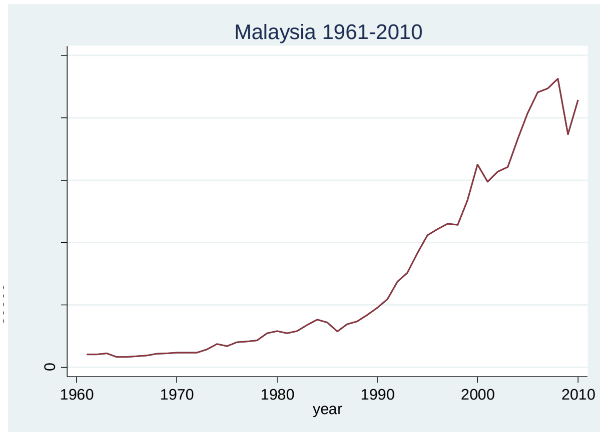
Appendix 22 (Continued): Plots of time series of exports for MFIs



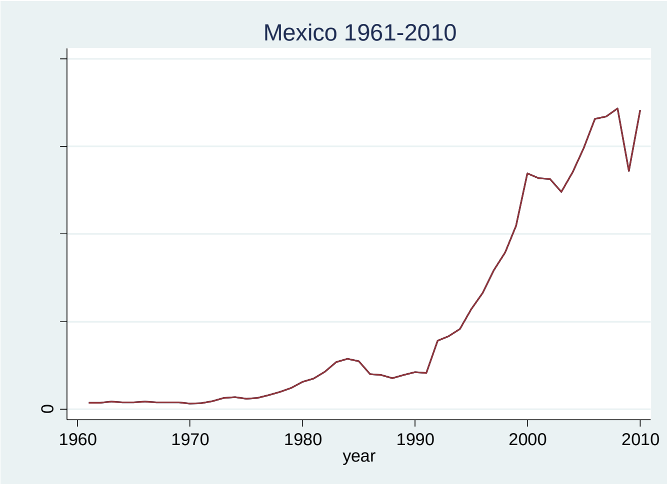


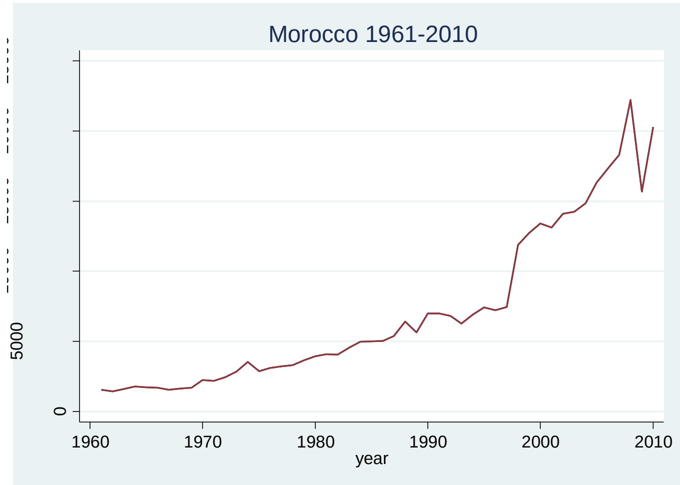


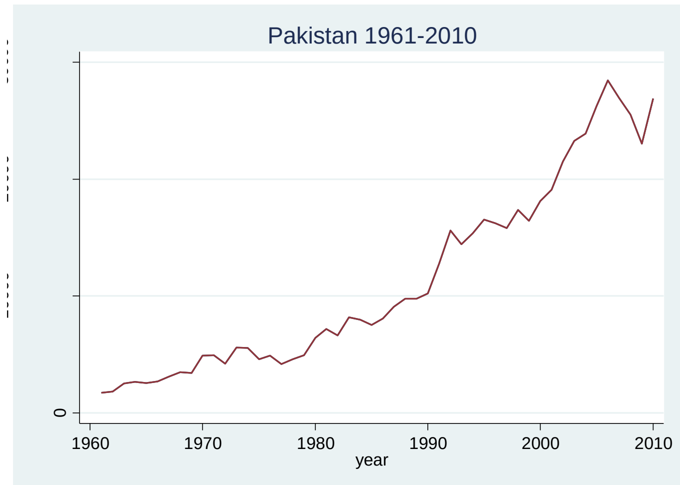


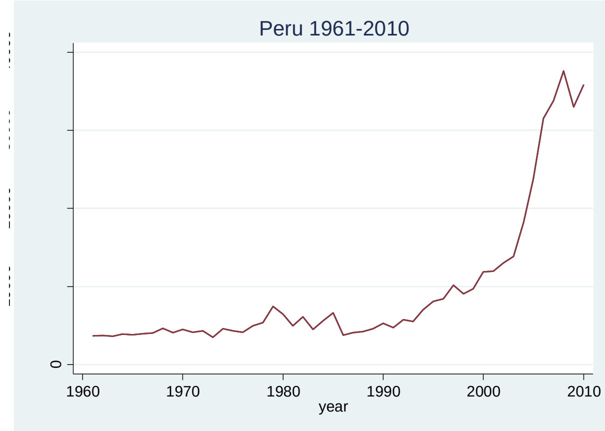


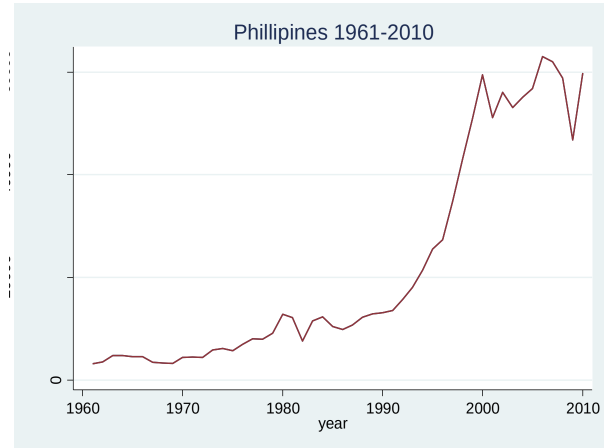
Appendix 22 (Continued): Plots of time series of exports for MFIs

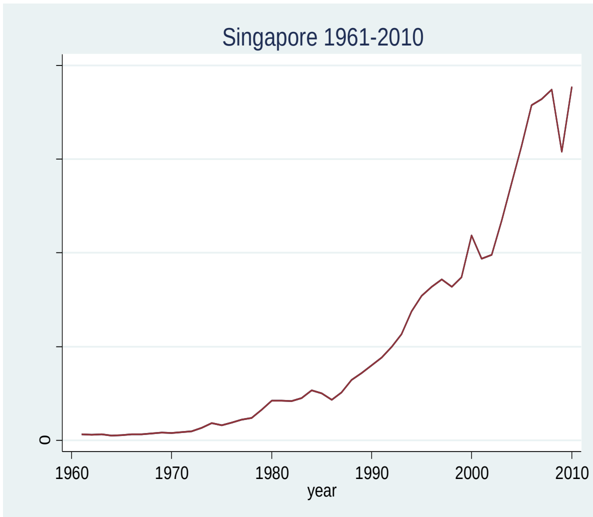




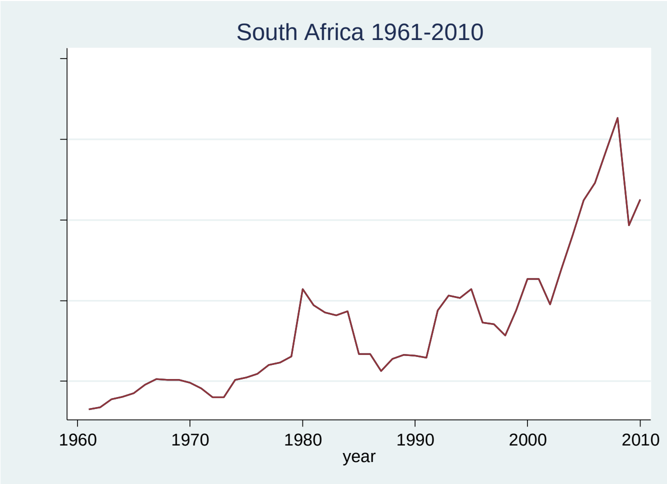


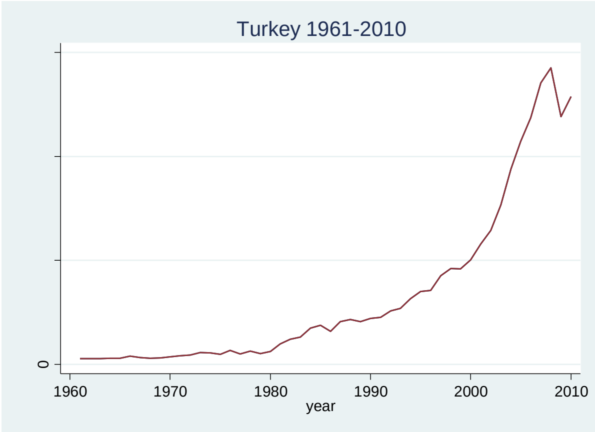




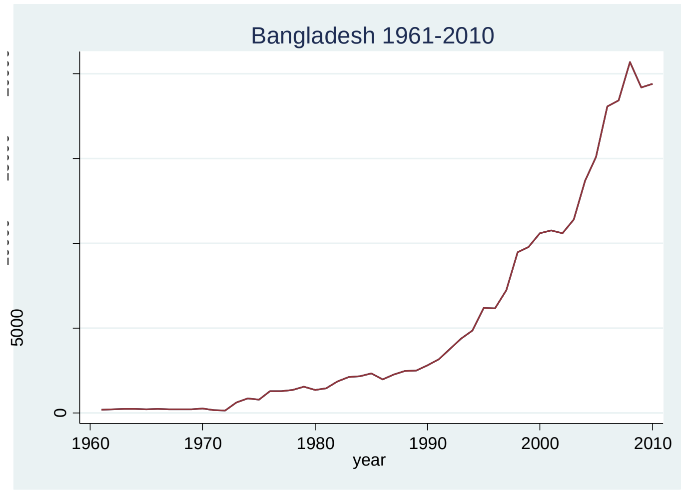


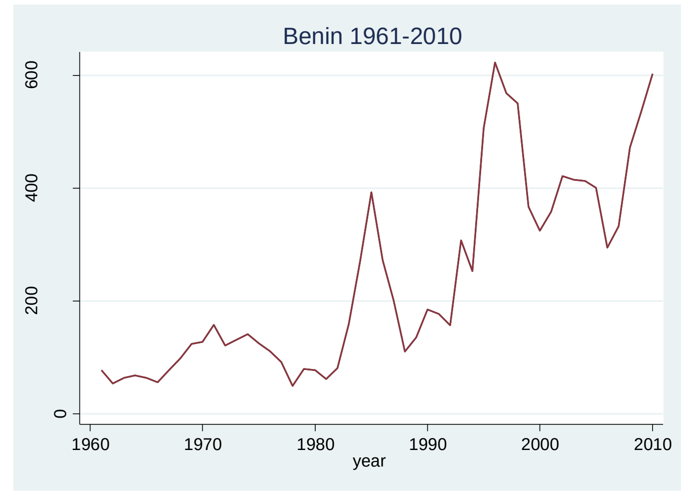
Appendix 22 (Continued): Plots of time series of exports for MFIs

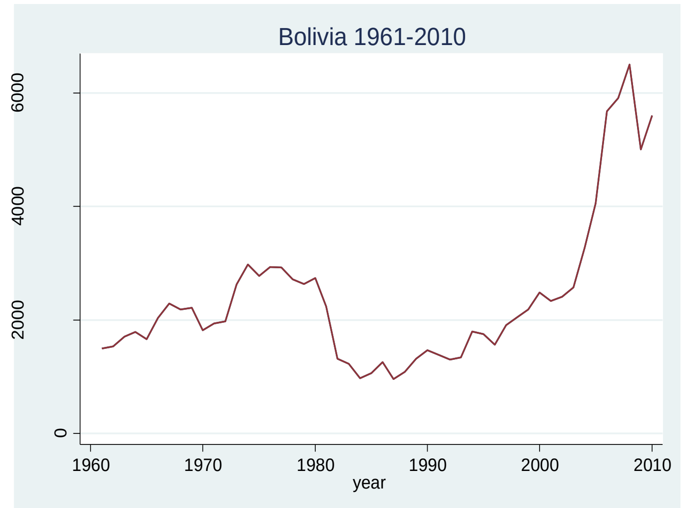


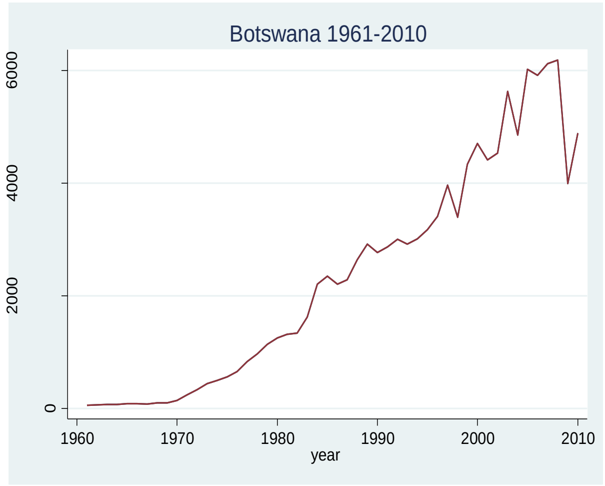


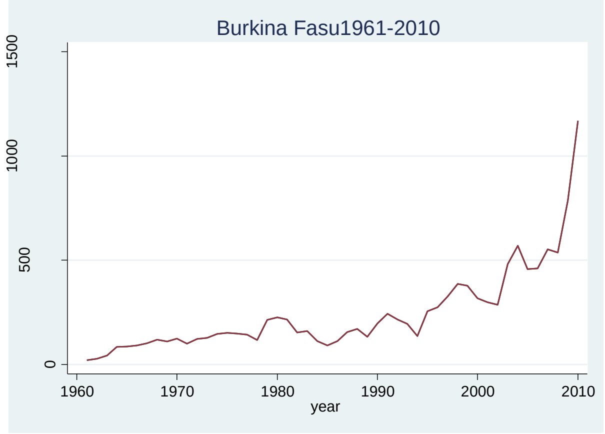
Appendix 23: Plots of time series of exports for LFIs

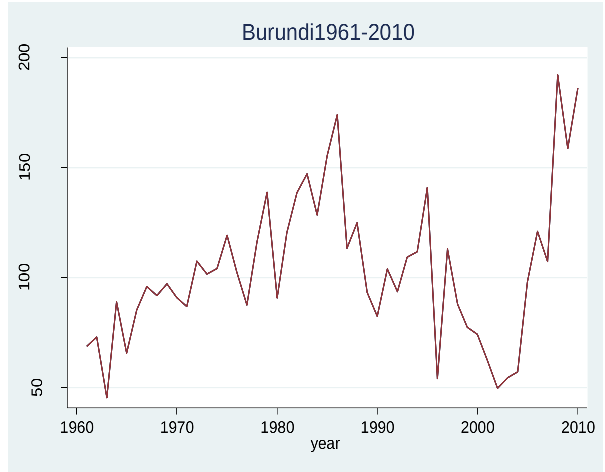




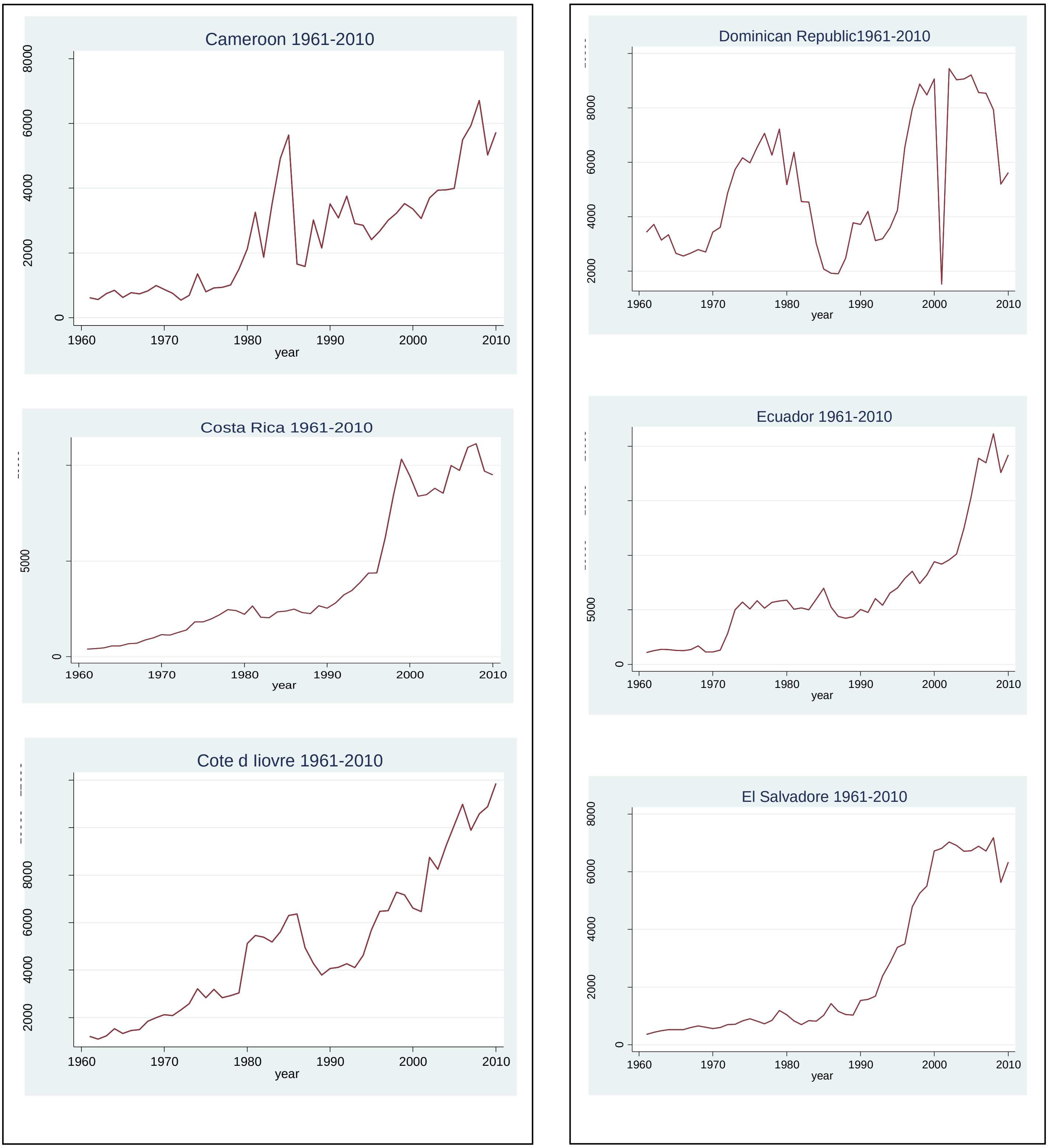




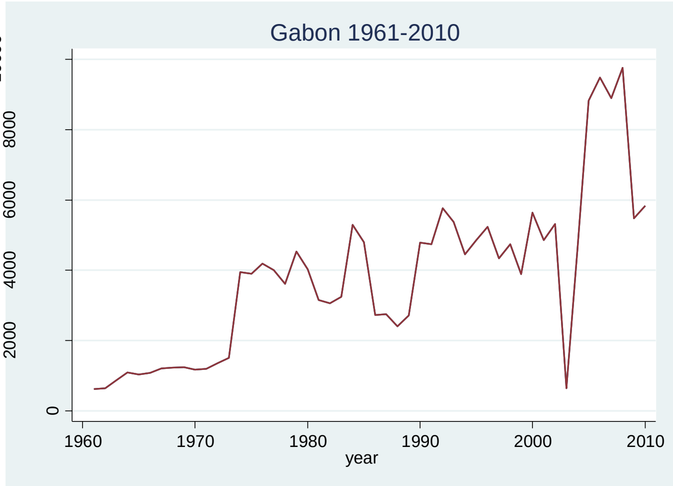


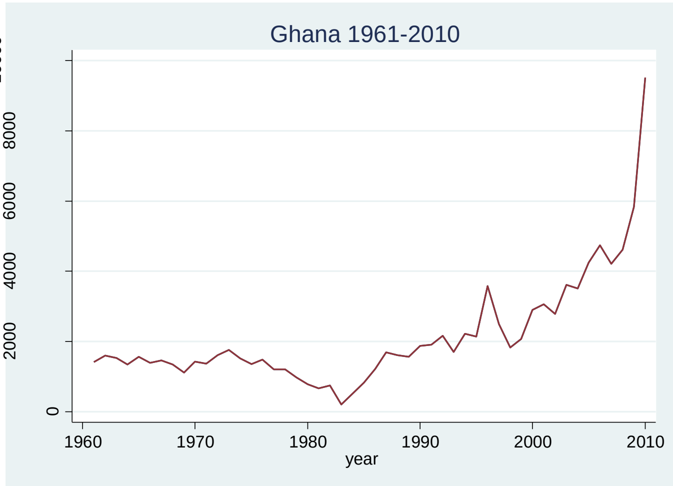


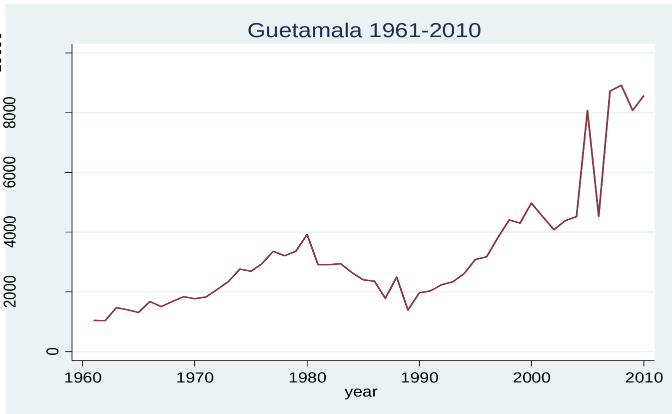
Appendix 23 (Continued): Plots of time series of exports for LFIs

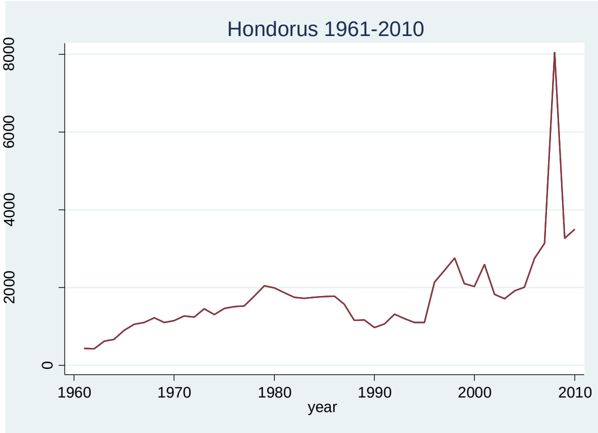


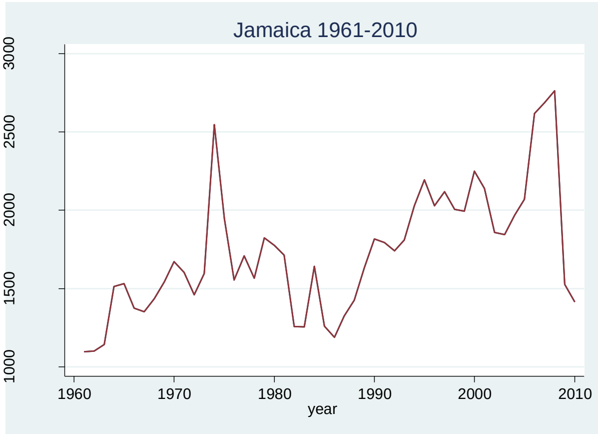
Appendix 23 (continued): Plots of time series of exports for LFIs

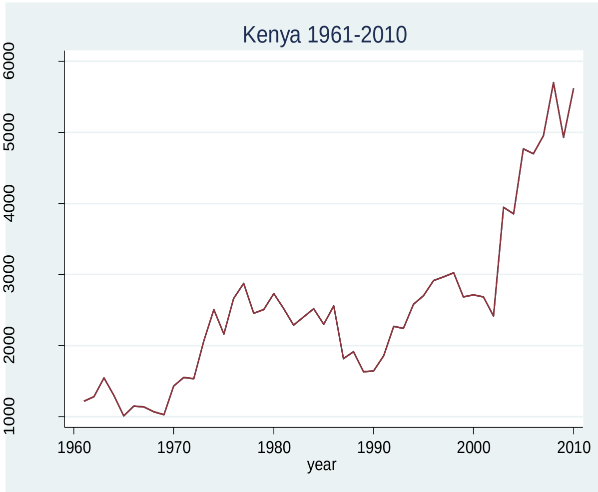




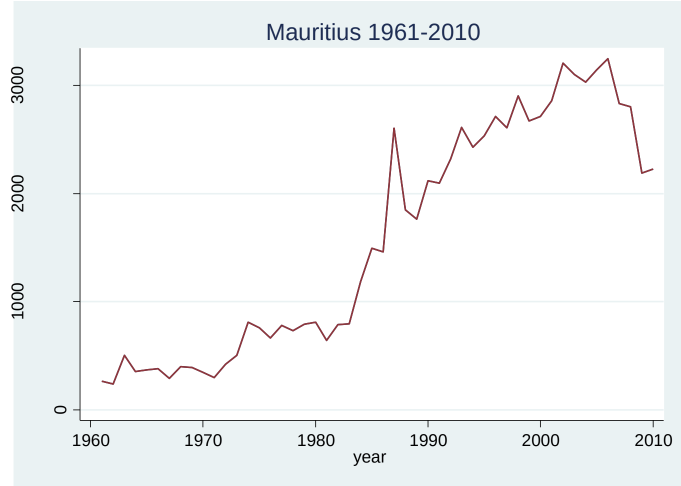


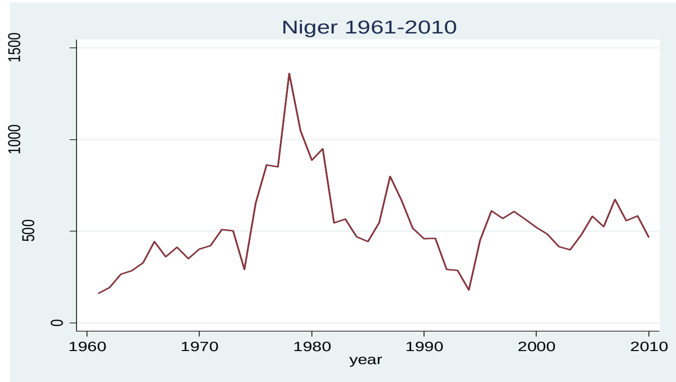


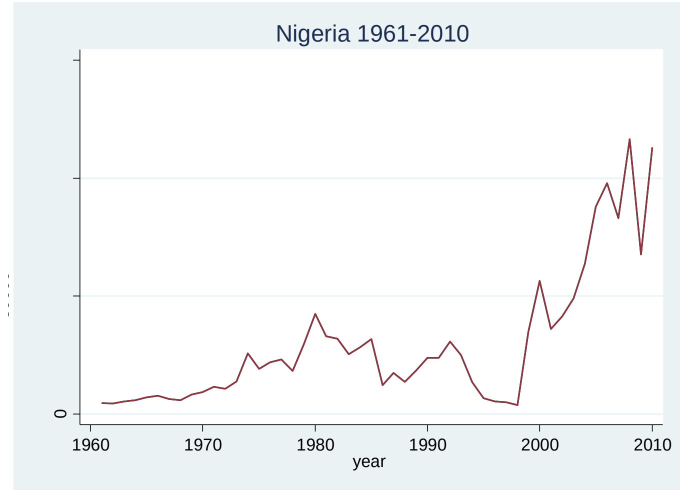


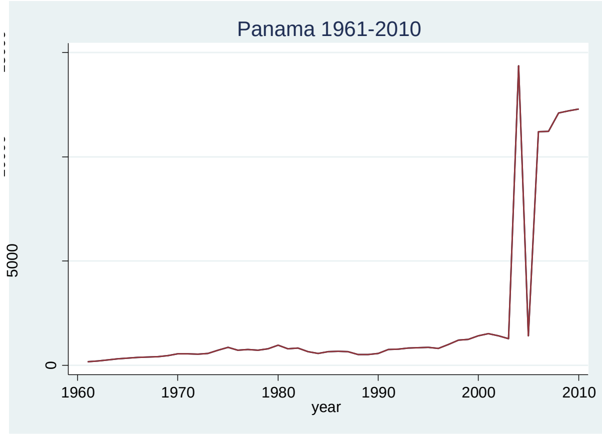


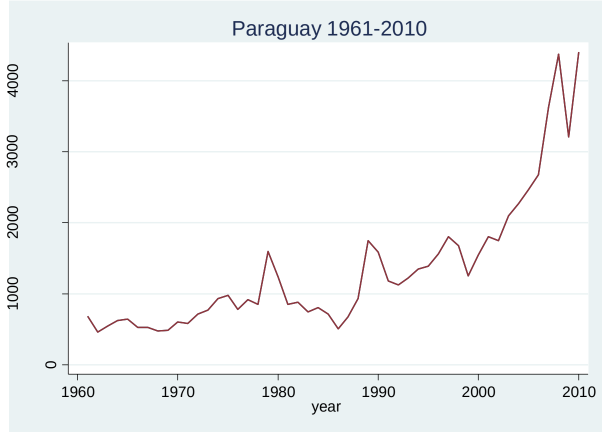
Appendix 23 (continued): Plots of time series of exports for LFIs

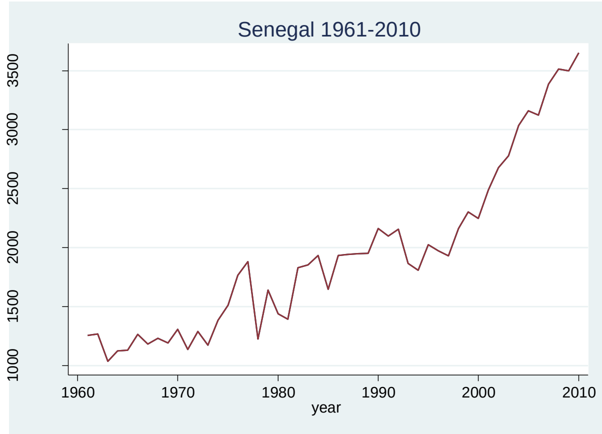




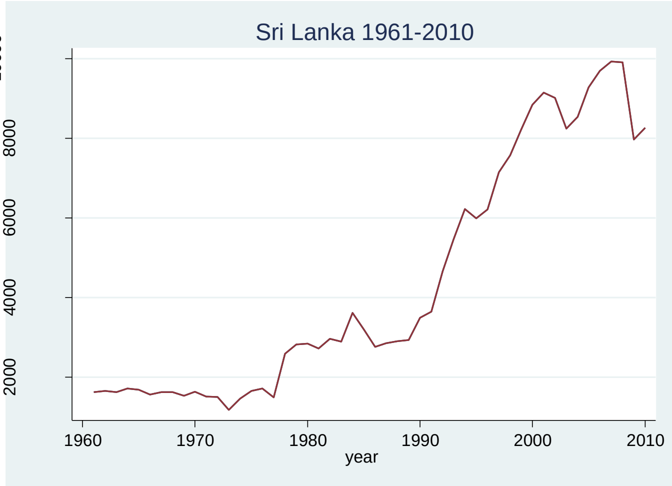


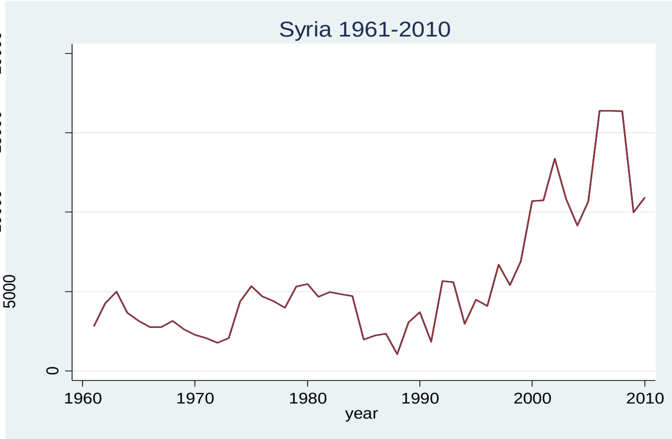


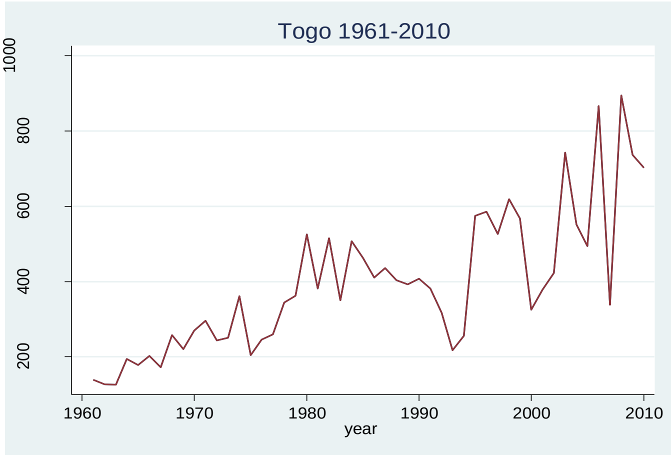


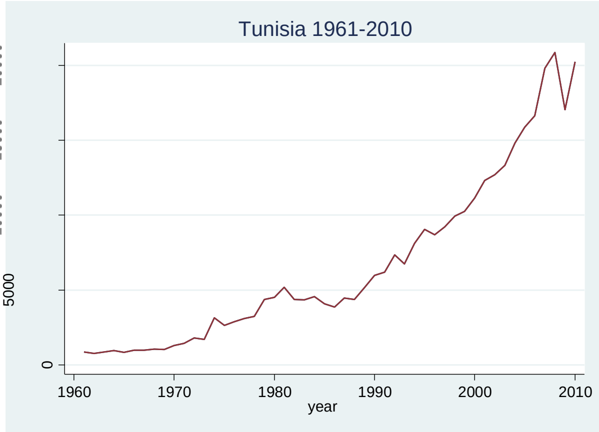


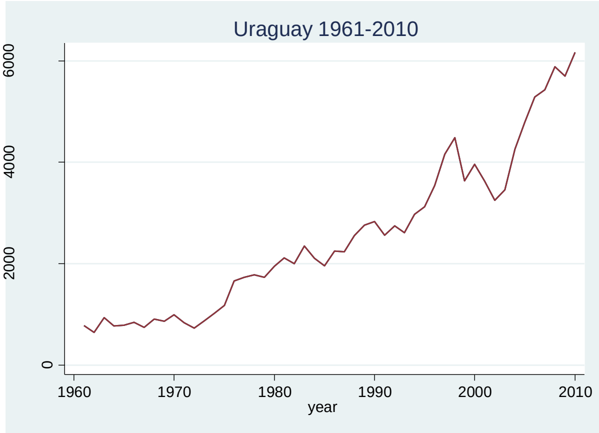
Appendix 23 (continued): Plots of time series of exports for LFIs



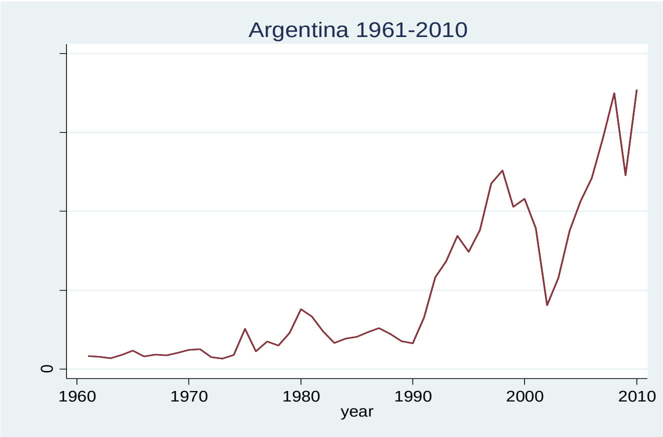


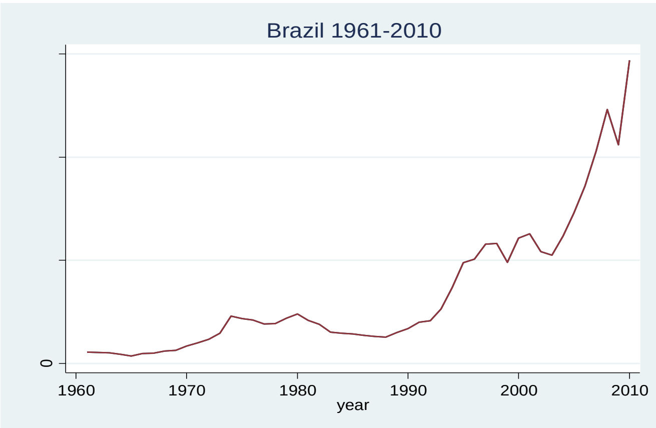


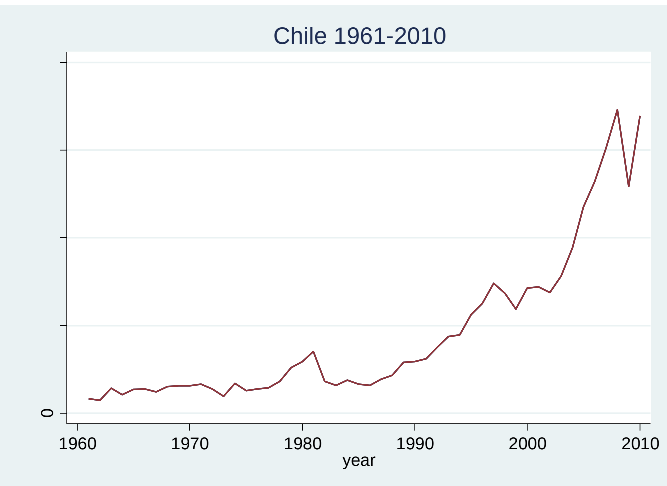


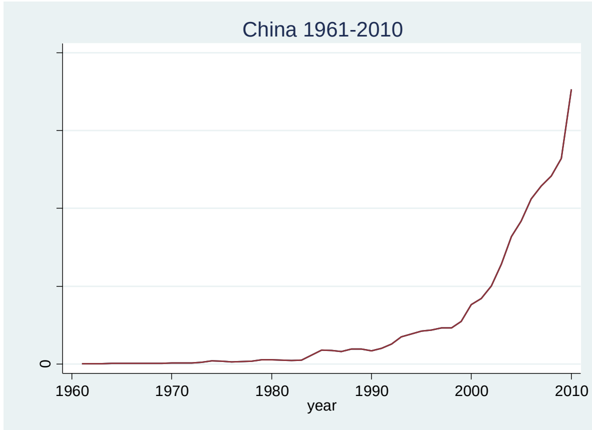


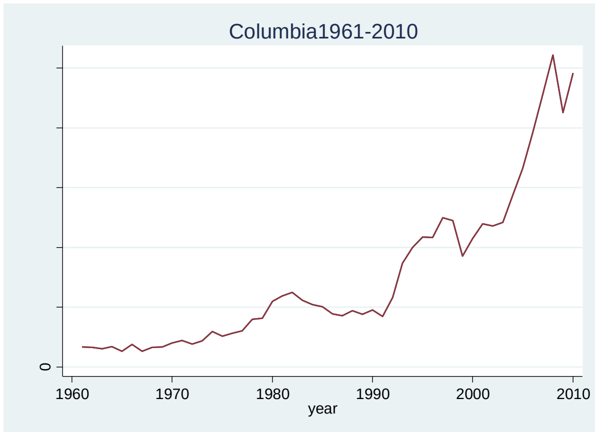
Appendix 24: Plots of time series of imports for MFIs.

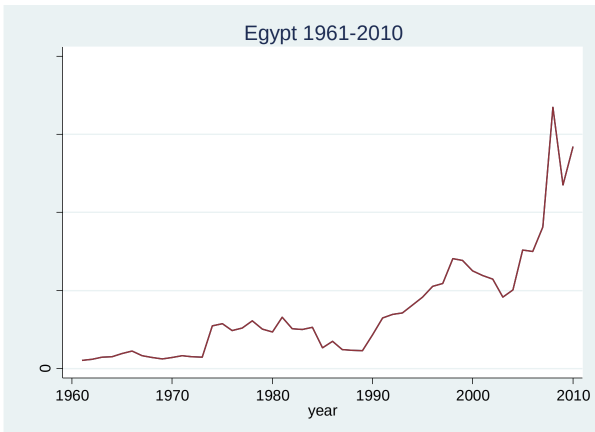




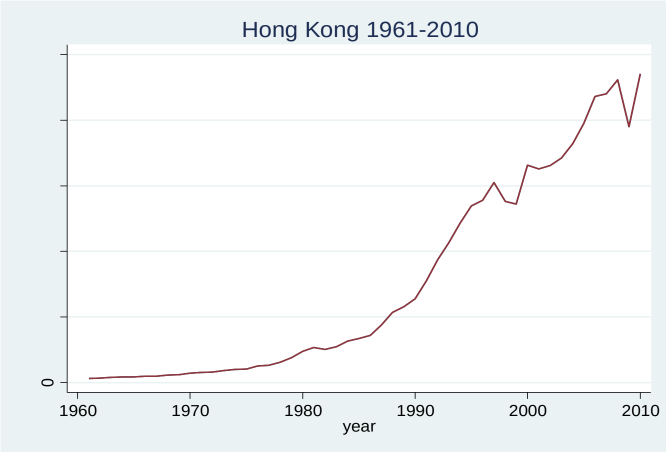


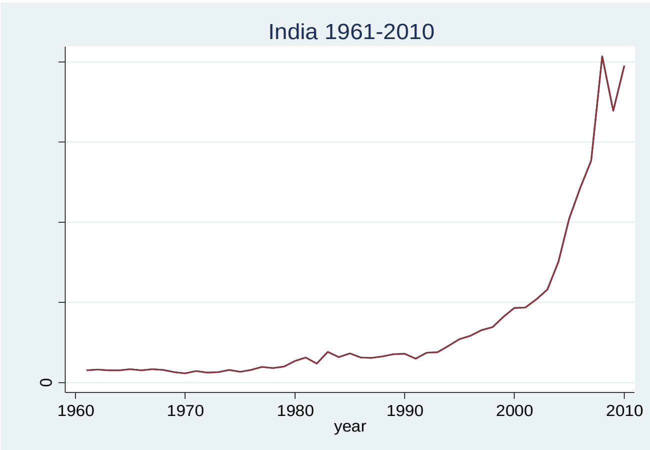


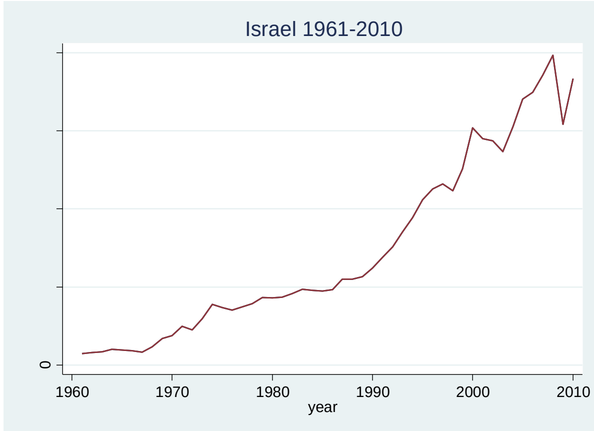


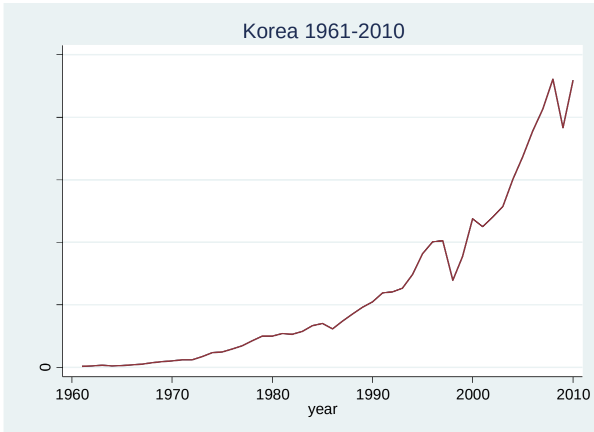


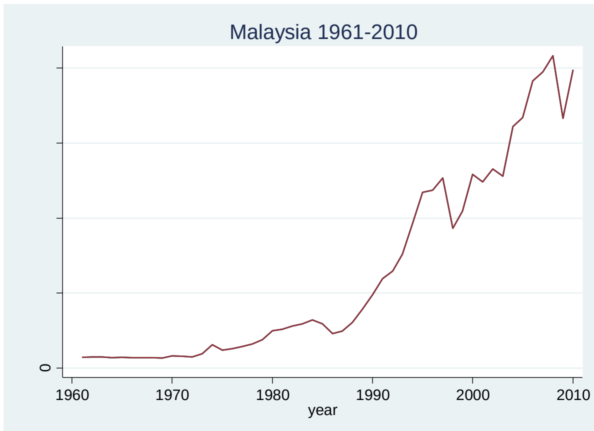
Appendix 24 (Continued): Plots of time series of imports for MFIs.



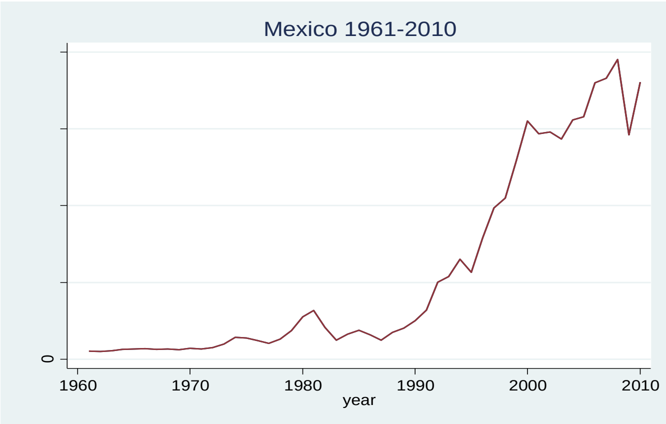


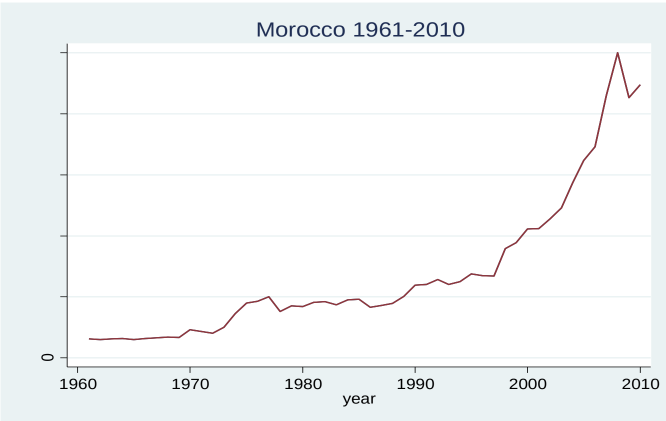


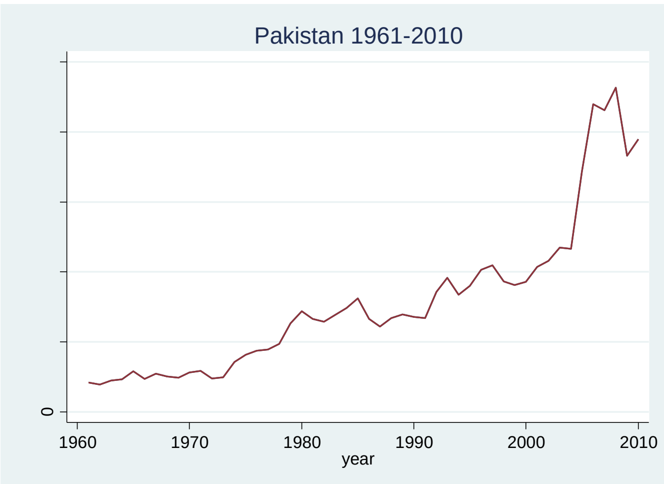


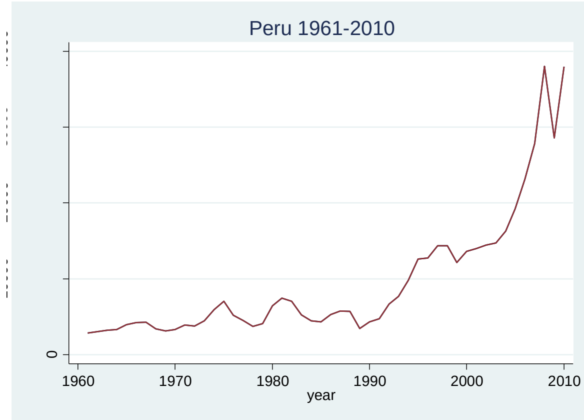


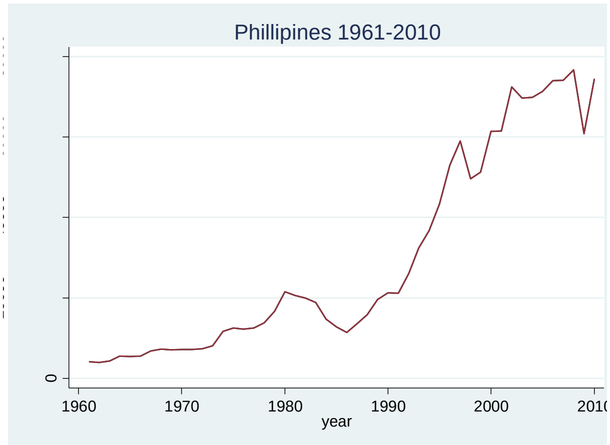
Appendix 24 (Continued): Plots of time series of imports for MFIs.

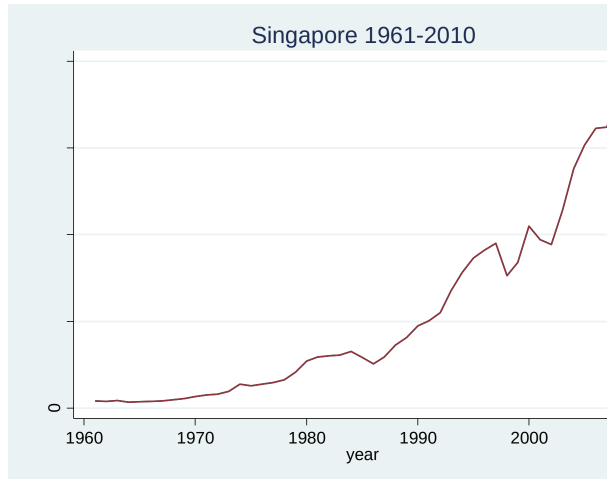




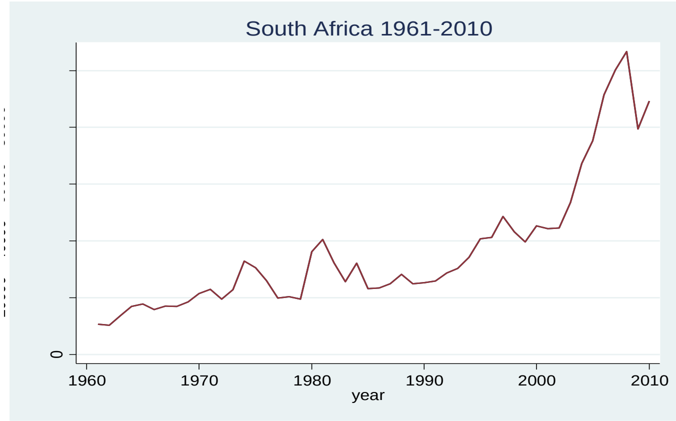


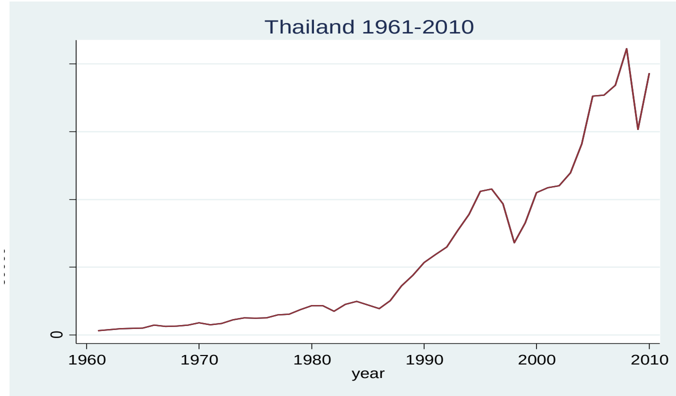


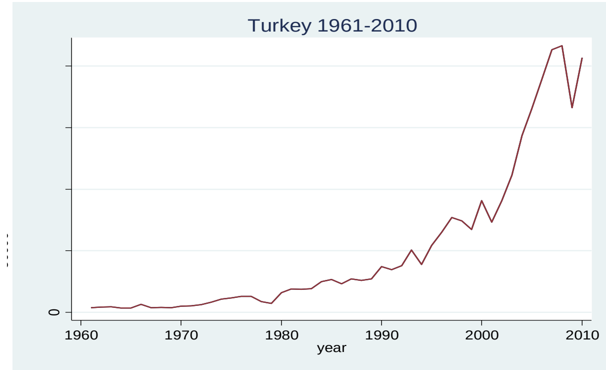




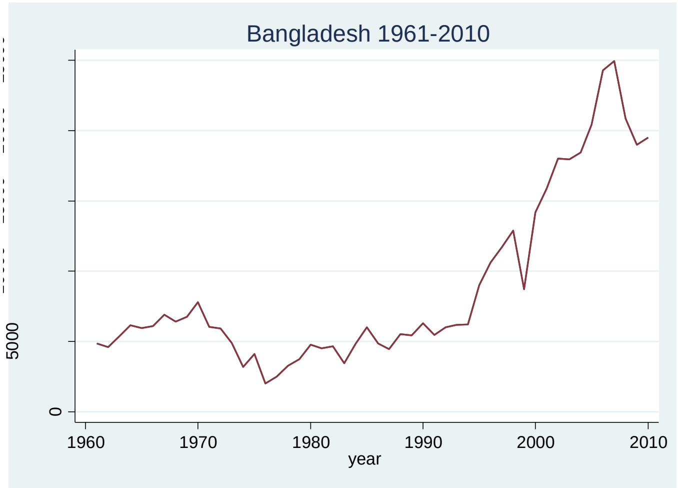
Appendix 24 (Continued): Plots of time series of imports for MFIs.

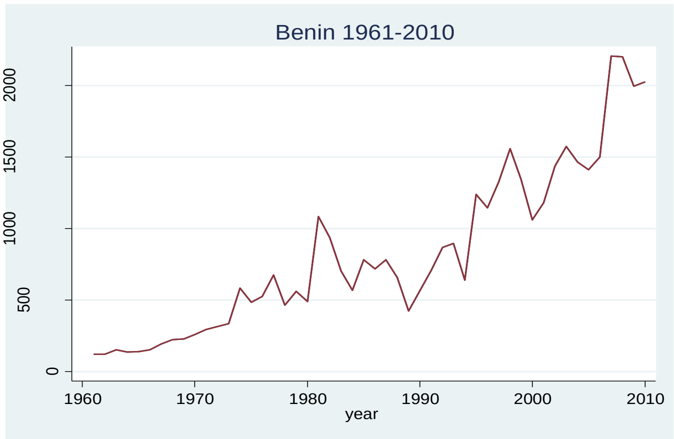


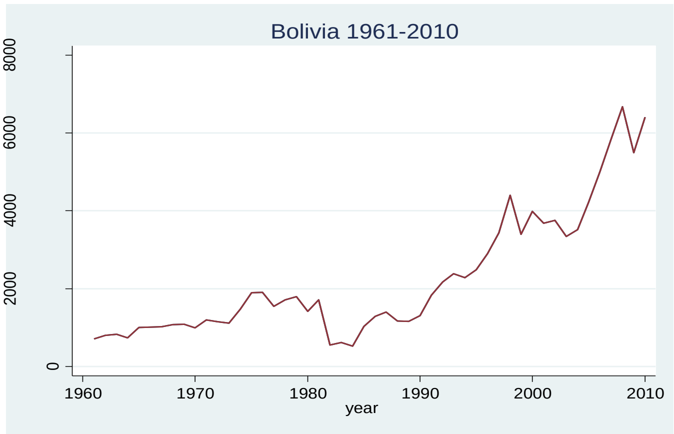


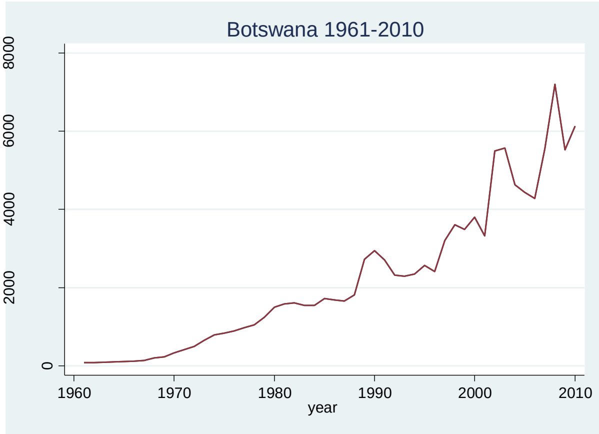


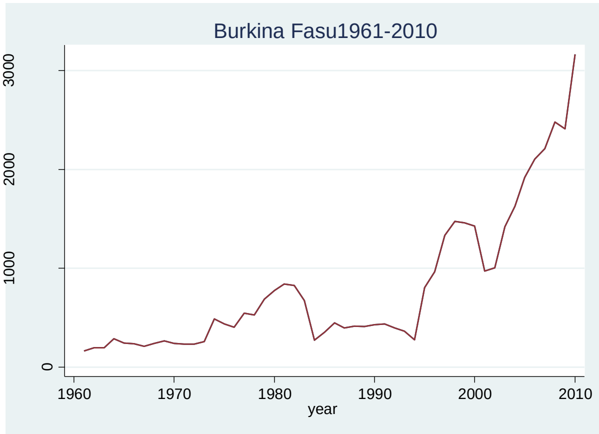
Appendix 25: Plots of time series of imports for LFIs.

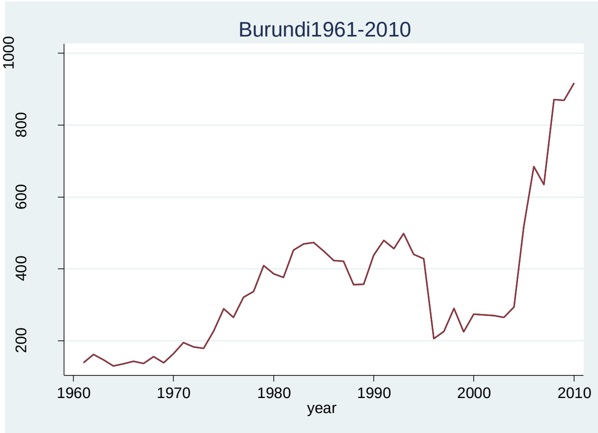




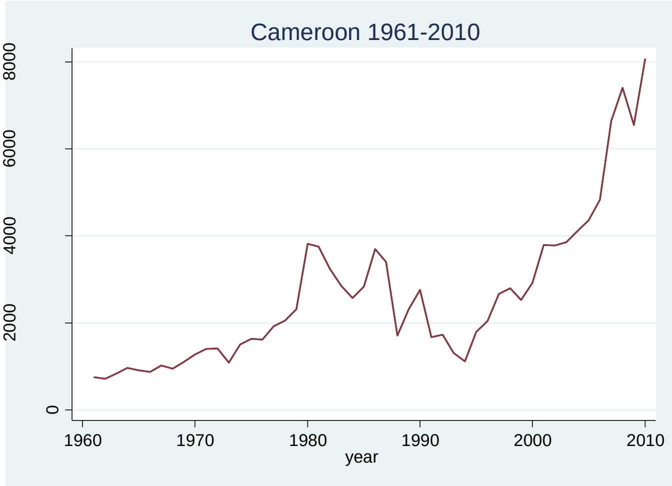


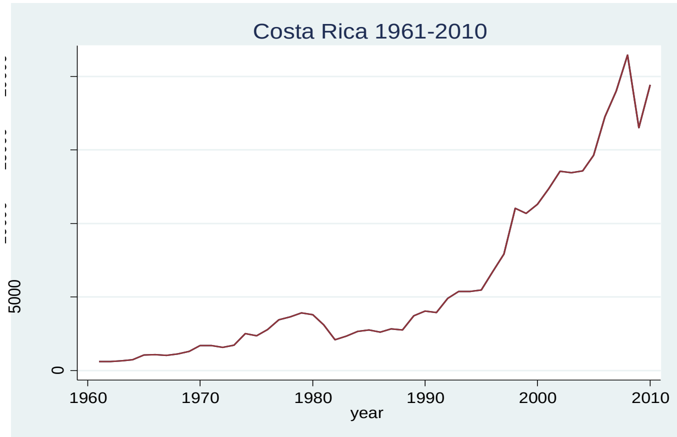


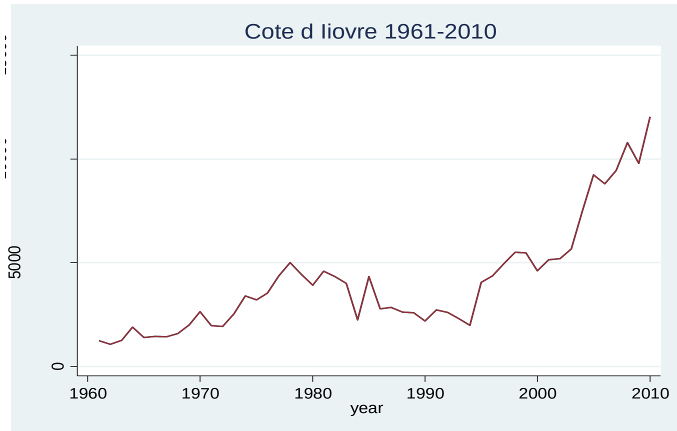


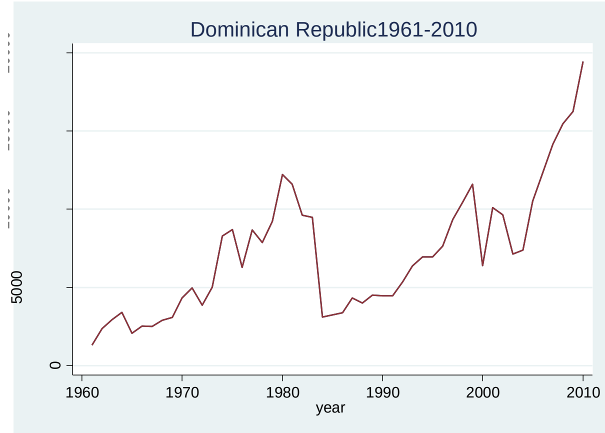


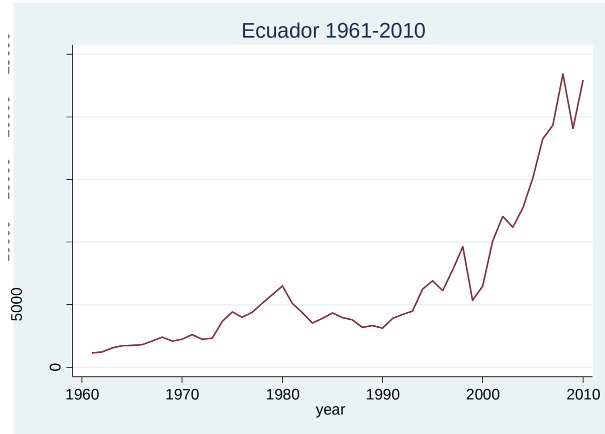
Appendix 25 (Continued): Plots of time series of imports for LFIs..

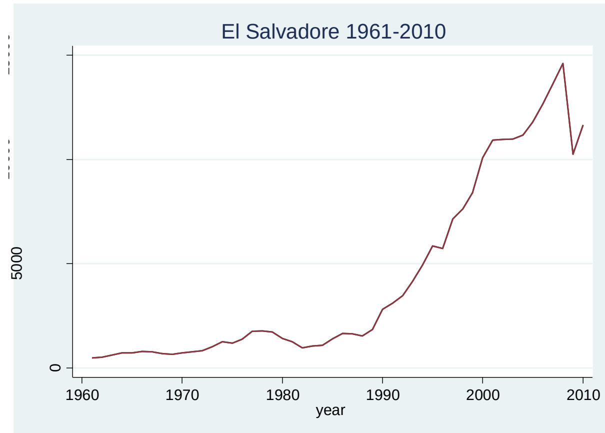




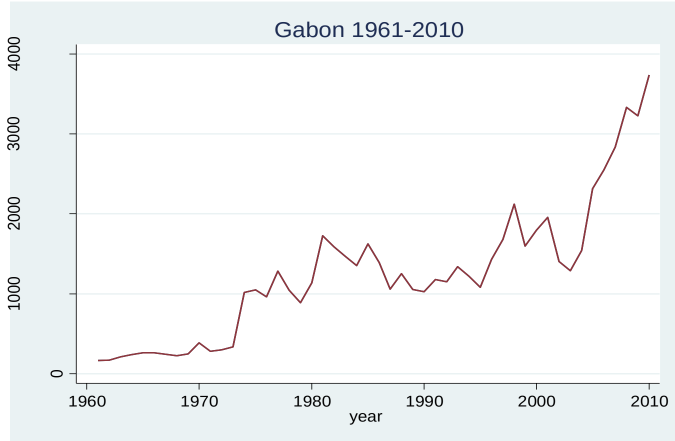


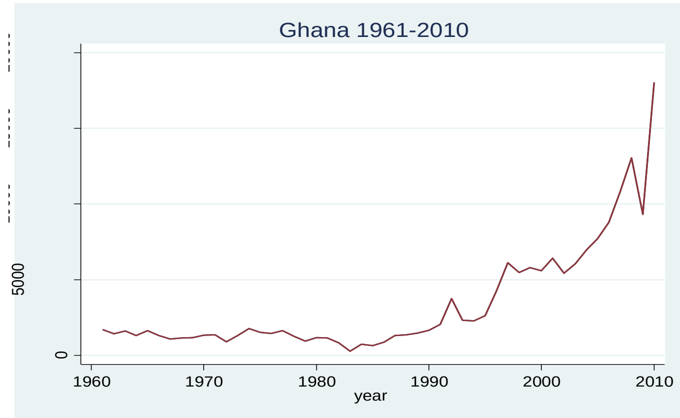


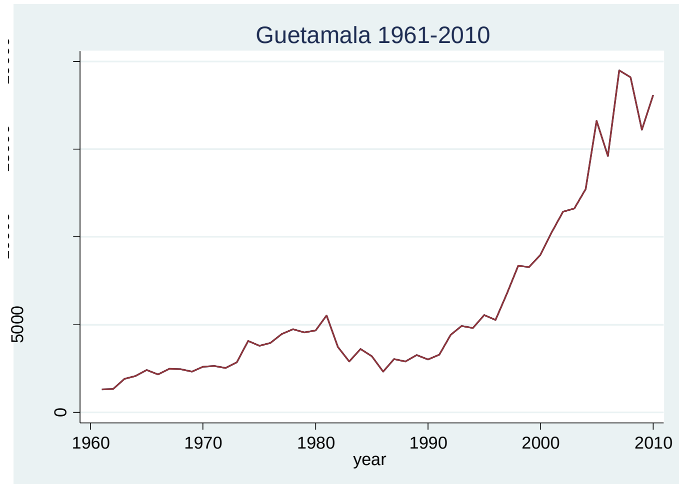


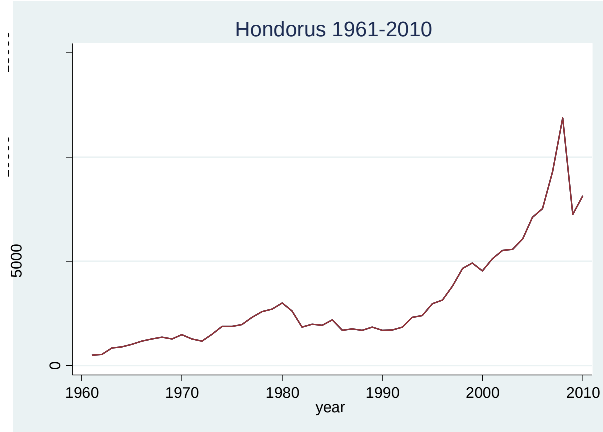


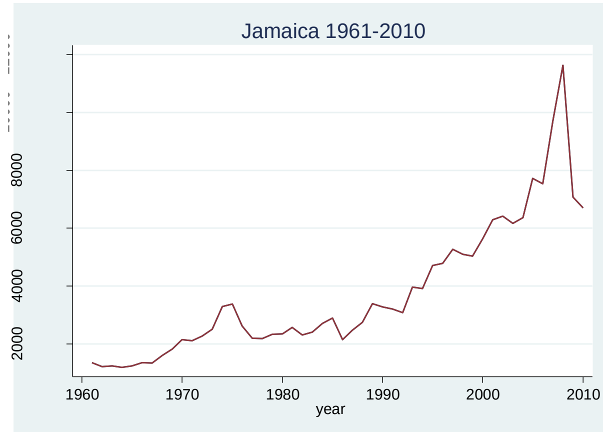
Appendix 25 (Continued): Plots of time series of imports for LFIs.

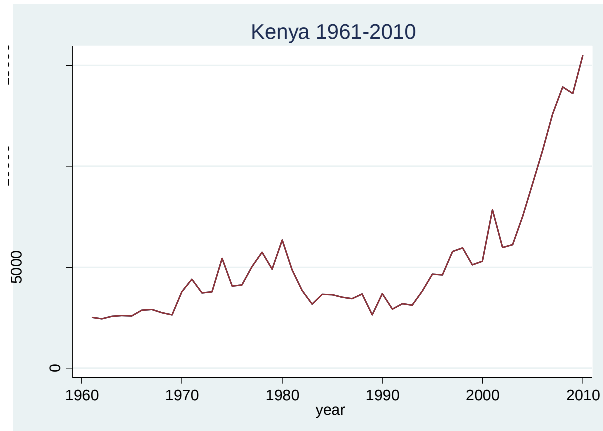




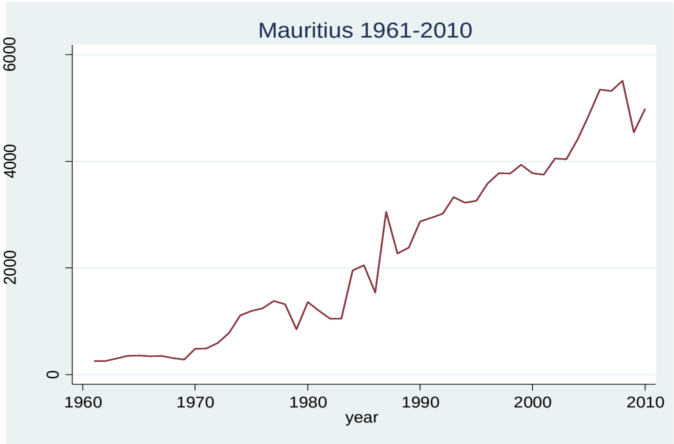


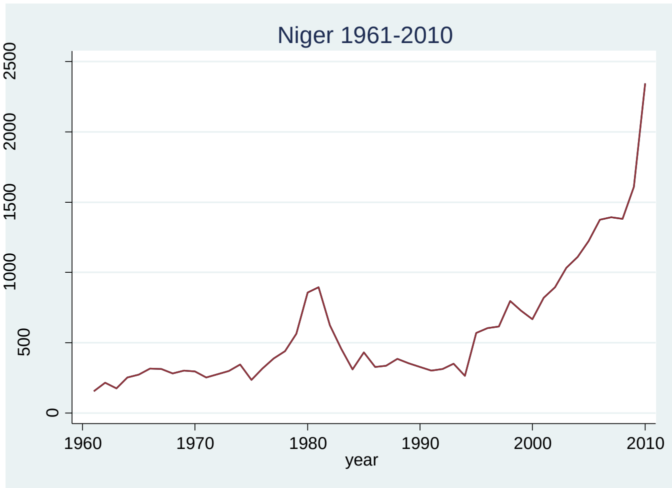


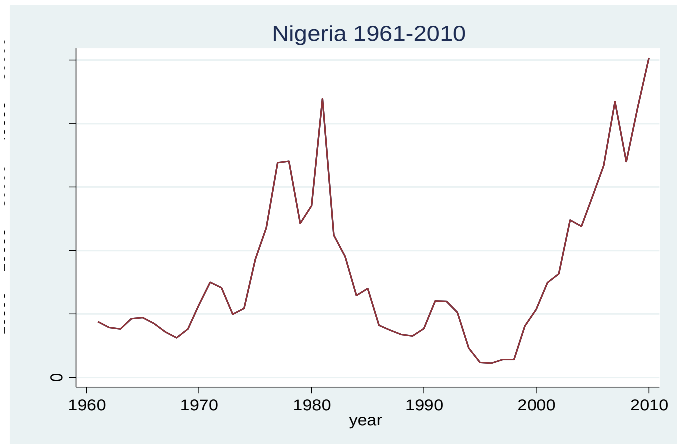


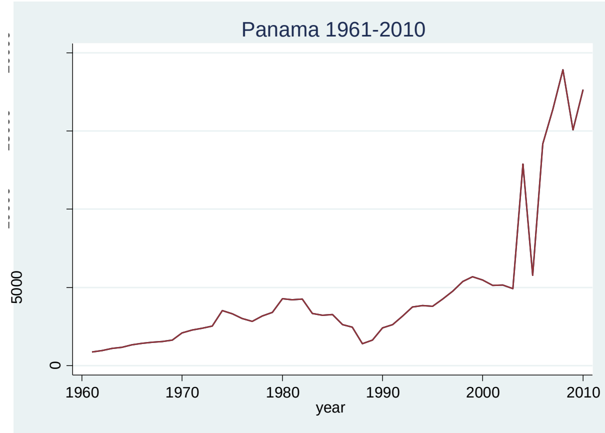


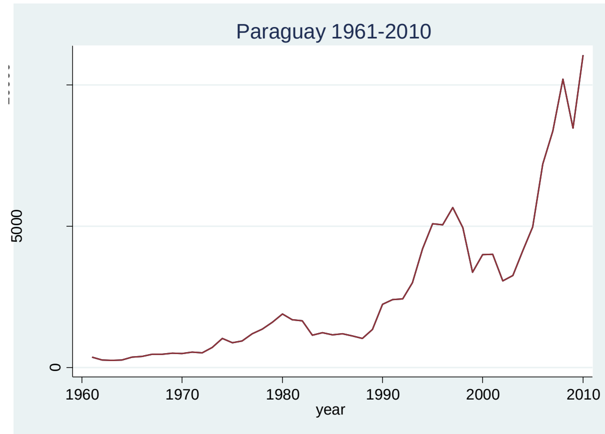
Appendix 25 (Continued): Plots of time series of imports for LFIs.

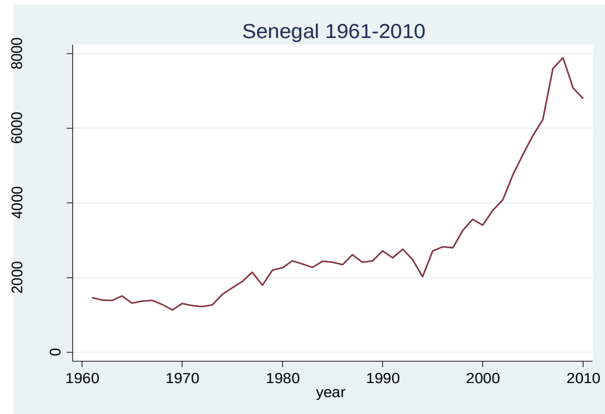




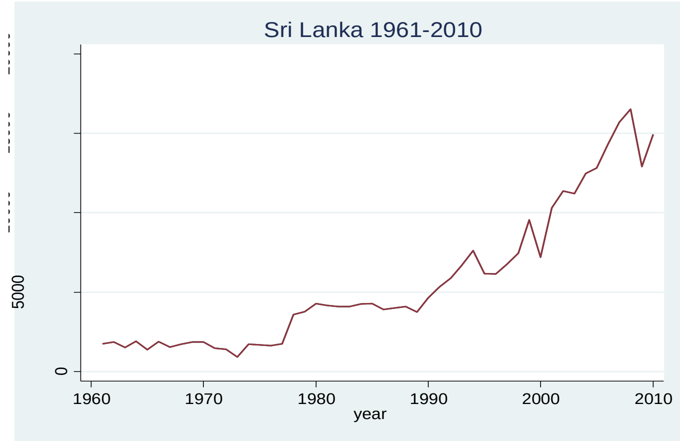


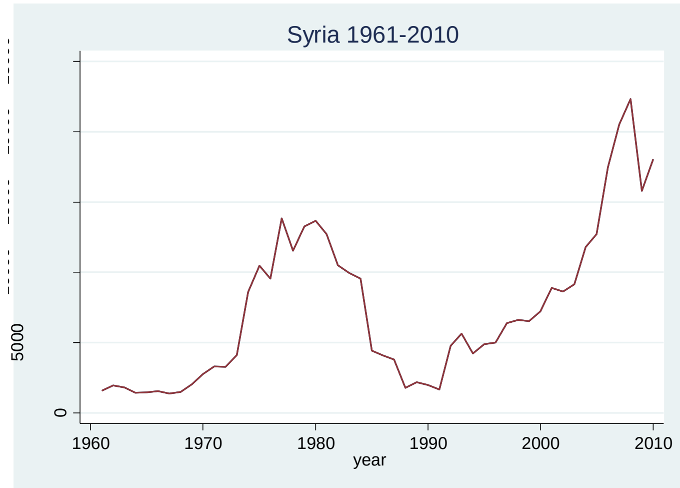


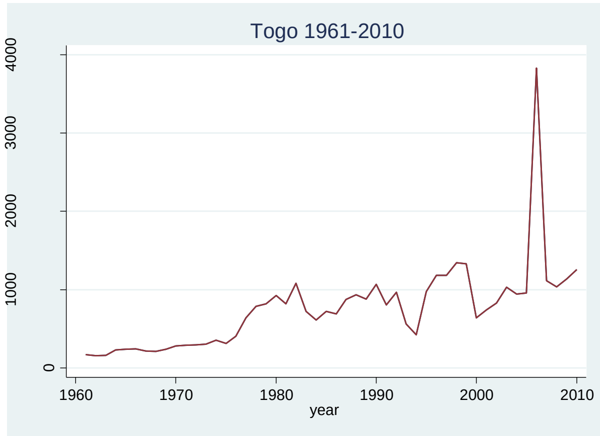


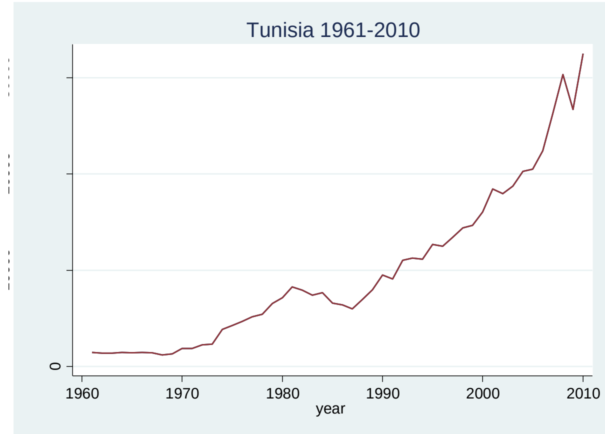


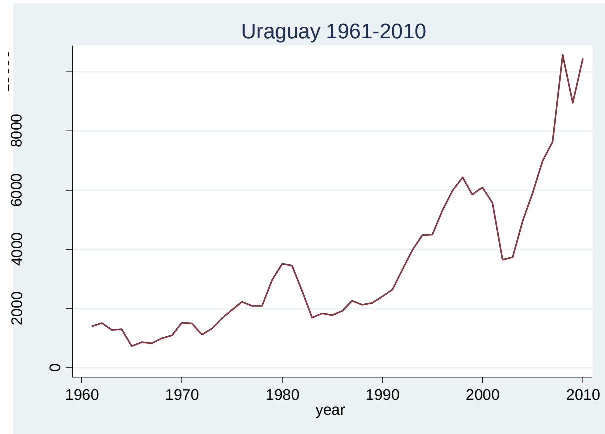
Appendix 25 (Continued): Plots of time series of imports for LFIs.











Appendix 26: Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels				**First difference**			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Argentina	LWG_t	-0.82	C,t	-0.63	C,t	-4.94***	N	-3.89***	N
	LX_t	-3.45*	C,t	-3.44*	C,t	-8.59***	C	-9.30***	C
	LM_t	-3.49*	C,t	-3.43*	C,t	-7.21***	N	-7.39***	N
Brazil	LWG_t	-2.55	C,t	-1.97	C,t	-4.08***	N	-4.12***	N
	LX_t	-2.83	C,t	-2.93	C,t	-6.33***	C	-8.03***	C
	LM_t	-1.85	C,t	-1.97	C,t	-4.92***	C	-4.89***	C
Chile	LWG_t	-2.29	C,t	-1.89	C,t	-5.24***	N	-5.21***	N
	LX_t	-3.34*	C,t	-3.31*	C,t	-7.35***	C	-10.71***	C
	LM_t	-2.64	C,t	-2.64	C,t	-9.04***	C	-9.04***	C
China	LWG_t	-2.20	C,t	-1.58	C,t	-5.19***	C	-5.92***	C
	LX_t	-2.74	C,t	-2.74	C,t	-5.88***	C	-6.63***	C
	LM_t	-6.15***	C,t	-3.05	C,t	-	-	-	-
Columbia	LWG_t	-2.37	C,t	-2.43	C,t	-6.54***	N	-6.53***	N
	LX_t	-4.10**	C,t	-2.93	C,t	-5.23***	C	-7.87***	C
	LM_t	-3.01	C,t	-3.08	C,t	-8.41***	C	-8.39***	C
Egypt	LWG_t	-1.96	C,t	-1.81	C,t	-2.66***	N	-5.37***	N
	LX_t	-1.71	C,t	-1.89	C,t	-6.03***	N	-6.02***	N
	LM_t	-2.62	C,t	-2.79	C,t	-7.00***	N	-7.00***	N

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Hong Kong	LWG_t	-3.52**	C,t	-2.40	C,t	-	-	-	-
	LX_t	0.14	C,t	0.34	C,t	-6.48***	C	-6.57***	C
	LM_t	-0.29	C,t	-0.33	C,t	-6.34***	C	-6.35***	C
India	LWG_t	-0.87	C,t	-0.72	C,t	-5.47***	N	-5.32***	N
	LX_t	-0.93	C,t	-0.75	C,t	-5.97***	C	-5.97***	C
	LM_t	-0.84	C,t	-0.93	C,t	-8.72***	C	-8.49***	C
Indonesia	LWG_t	-2.12	C,t	-1.26	C,t	-7.15***	C	-7.08***	C
	LX_t	-3.17	C,t	-3.19*	C,t	-7.35***	N	-7.35***	N
	LM_t	3.70**	C,t	-3.83**	C,t	-	-	-	-
Israel	LWG_t	-2.82	C,t	-2.03	C,t	-4.57***	N	-3.81***	N
	LX_t	-1.93	C,t	-1.85	C,t	-7.41***	C	-7.40***	C
	LM_t	-1.83	C,t	-1.84	C,t	-6.58***	C	-6.57***	C
Korea	LWG_t	-1.23	C,t	-3.37	C,t	-9.84***	C	-10.20***	C
	LX_t	-2.21	C,t	-2.21	C,t	-3.66***	C	-3.56***	C
	LM_t	-1.95	C,t	-1.82	C,t	-6.76***	C	-6.77	C
Malaysia	LWG_t	-2.97	C,t	-2.11	C,t	-4.04***	N	-3.93***	N
	LX_t	-3.05	C,t	-3.08	C,t	-6.90***	C	-6.91***	C
	LM_t	-2.76	C,t	-2.84	C,t	-6.57***	C	-6.56***	C

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Mexico	LWG_t	-3.86**	C,t	-3.08	C,t	-	-	-	-
	LX_t	-2.24	C,t	-2.49	C,t	-5.61***	C	-5.61***	C
	LM_t	-2.82	C,t	-2.36	C,t	-5.07***	N	-5.15***	N
Morocco	LWG_t	-3.02	C,t	-2.99	C,t	-7.49***	N	-7.58***	N
	LX_t	-4.31***	C,t	-4.31***	C,t	-	-	-	-
	LM_t	-2.06	C,t	-2.16	C,t	-6.63***	C	-6.63***	C
Pakistan	LWG_t	-5.49***	C,t	-5.49***	C,t	-	-	-	-
	LX_t	-3.58**	C,t	-3.60**	C,t	-	-	-	-
	LM_t	-2.72	C,t	-2.80	C,t	-5.85***	C	-7.58***	C
Peru	LWG_t	-1.38	C,t	-1.64	C,t	-5.38***	N	-3.89***	N
	LX_t	-1.24	C,t	-1.03	C,t	-8.62***	C	-8.53***	C
	LM_t	-1.66	C,t	-1.53	C,t	-5.43***	N	-5.33***	N
Philippines	LWG_t	-2.56	C,t	-2.07	C,t	-4.09***	N	-4.16***	N
	LX_t	-2.38	C,t	-2.35	C,t	-6.32***	C	-7.02***	C
	LM_t	-2.73	C,t	-2.24	C,t	-5.32***	C	-5.32***	C
Singapore	LWG_t	-2.16	C,t	-3.42	C,t	-6.17***	N	-6.35***	N
	LX_t	-2.43	C,t	-2.59	C,t	-6.40***	C	-6.40***	C
	LM_t	-1.89	C,t	-2.11	C,t	-6.23***	C	-6.21***	C

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
South Africa	LWG_t	-2.07	C,t	-2.87	C,t	-4.54***	N	-4.49***	N
	LX_t	-2.74	C,t	-2.84	C,t	-6.64***	N	-6.64***	N
	LM_t	-2.66	C,t	-2.69	C,t	-6.31***	N	-6.29***	N
Thailand	LWG_t	-2.55	C,t	-2.32	C,t	-4.76***	N	-4.76***	N
	LX_t	-2.30	C,t	-2.52	C,t	-7.51***	C	-7.49***	N
	LM_t	-3.06	C,t	-3.14	C,t	-6.12***	C	-8.80***	C
Turkey	LWG_t	-2.72	C,t	-2.72	C,t	-6.80***	N	-6.80***	N
	LX_t	-3.35*	C,t	-3.31*	C,t	-8.58***	C	-8.58***	C
	LM_t	-4.65***	C,t	-4.48***	C,t	-	-	-	-
Venezuela	LWG_t	-3.16	C,t	-2.59	C,t	-5.07***	N	-4.81***	N
	LX_t	-3.36*	C,t	-3.31*	C,t	-8.13***	N	-8.27***	N
	LM_t	-4.02**	C,t	-3.89**	C,t	-	-	-	-

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Argentina	LWG_t	-4.10	C,t	1985	Trend and intercept	I(1)	-6.08***	C	2000	Intercept only
	$LEXP_t$	-5.88***	C,t	1974	Trend and intercept	I(0)	-	-	-	
	$LIMP_t$	-4.80*	C,t	1990	Intercept only	I(1)	-7.83***	C	1992	Intercept only
Brazil	LWG_t	-3.29	C,t	1978	Trend and intercept	I(1)	-4.78**	C	1981	Intercept only
	$LEXP_t$	-5.16*	C,t	1985	Trend and intercept	I(1)	-8.38***	C	1986	Intercept only
	$LIMP_t$	-3.43	C,t	1980	Trend and intercept	I(1)	-5.57***	C	1974	Intercept only
Chile	LWG_t	-3.29	C,t	1978	Trend and intercept	I(1)	-4.78**	C	1981	Intercept only
	$LEXP_t$	-4.18	C,t	1975	Trend and intercept	I(1)	-7.82***	C	1974	Intercept only
	$LIMP_t$	-5.80***	C,t	1981	Trend and intercept	I(0)	-	-	-	
China	LWG_t	-5.53**	C,t	1992	Trend and intercept	I(0)	-	-	-	
	$LEXP_t$	-3.49	C,t	1999	Intercept only	I(1)	-7.26***	C	1974	Intercept only
	$LIMP_t$	-6.68***	C,t	1987	Intercept only	I(0)	-	-	-	
Columbia	LWG_t	-3.48	C,t	1995	Intercept only	I(1)	-7.54***	C	1998	Intercept only
	$LEXP_t$	-5.17**	C,t	1997	Intercept only	I(0)	-	-	-	
	$LIMP_t$	-4.01	C,t	1985	Intercept only	I(1)	-9.49***	C	1993	Intercept only
Egypt	LWG_t	-4.04	C,t	1983	Trend and intercept	I(1)	-6.60***	C	1975	Intercept only
	$LEXP_t$	-4.12	C,t	1984	Trend and intercept	I(1)	-7.51***	C	1991	Intercept only
	$LIMP_t$	-3.79	C,t	1984	Intercept only	I(1)	-8.89***	C	1974	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Hong Kong	LWG_t	-4.01	C,t	1974	Trend and intercept	I(1)	-5.16***	C	1998	Intercept only
	$LEXP_t$	-4.44	C,t	1991	Trend and intercept	I(1)	-8.61***	C	1994	Intercept only
	$LIMP_t$	-4.08	C,t	1991	Trend and intercept	I(1)	-7.73***	C	1995	Intercept only
India	LWG_t	-4.32	C,t	1979	Trend and intercept	I(1)	-6.34***	C	1979	Intercept only
	$LEXP_t$	-3.53	C,t	1984	Trend and intercept	I(1)	-6.92***	C	1991	Intercept only
	$LIMP_t$	-3.43	C,t	1989	Trend and intercept	I(1)	-10.65***	C	1991	Intercept only
Indonesia	LWG_t	-3.76	C,t	1993	Trend and intercept	I(1)	-8.36***	C	1998	Intercept only
	$LEXP_t$	-4.06	C,t	1983	Intercept only	I(1)	-8.07***	C	1986	Intercept only
	$LIMP_t$	-4.35*	C,t	1983	Trend only	I(1)	-8.78***	C	1986	Intercept only
Israel	LWG_t	-4.59	C,t	1974	Trend and intercept	I(1)	-5.31***	C	1975	Intercept only
	$LEXP_t$	-3.37	C,t	1980	Trend and intercept	I(1)	-8.52***	C	2000	Intercept only
	$LIMP_t$	-3.66	C,t	1973	Trend and intercept	I(1)	7.66***	C	1974	Intercept only
Korea	LWG_t	-3.51	C,t	1986	Trend and intercept	I(1)	-10.61***	C	1980	Intercept only
	$LEXP_t$	2.53	C,t	1986	Intercept only	I(1)	-8.46***	C	1977	Intercept only
	$LIMP_t$	-5.12*	C,t	1976	Trend and intercept	I(1)	-7.90***	C	1998	Intercept only
Malaysia	LWG_t	-4.43	C,t	1980	Trend and intercept	I(1)	-5.26***	C	1984	Intercept only
	$LEXP_t$	-4.24	C,t	1991	Intercept only	I(1)	-7.88***	C	1986	Intercept only
	$LIMP_t$	-3.57	C,t	1986	Intercept only	I(1)	-7.84***	C	1974	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Mexico	LWG_t	-5.70**	C,t	1979	Trend and Intercept	I(0)	-	-	-	
	$LEXP_t$	-2.64	C,t	1974	Trend only	I(1)	-6.21***	C	1986	Intercept only
	$LIMP_t$	-4.45	C,t	1994	Intercept only	I(1)	-6.71***	C	1983	Intercept only
Morocco	LWG_t	-3.99	C,t	1980	Trend and Intercept	I(1)	-8.87***	C	1974	Intercept only
	$LEXP_t$	-6.03***	C,t	1997	Intercept only	I(0)	-	-	-	
	$LIMP_t$	-3.35	C,t	1982	Intercept only	I(1)	-7.65***	C	1974	Intercept only
Pakistan	LWG_t	6.35***	C,t	1979	Intercept only	I(0)	-	-	-	
	$LEXP_t$	-4.37	C,t	1990	Trend and Intercept	I(1)	-8.66***	C	1975	Intercept only
	$LIMP_t$	-3.68	C,t	1985	Intercept only	I(1)	-7.34***	C	1974	Intercept only
Peru	LWG_t	-3.96	C,t	1988	Trend and Intercept	I(1)	-6.10***	C	1990	Intercept only
	$LEXP_t$	-5.91***	C,t	1985	Trend and Intercept	I(0)	-	-	-	
	$LIMP_t$	-5.61**	C,t	1987	Trend and Intercept	I(0)	-	-	-	
Philippines	LWG_t	-3.92	C,t	1996	Trend and Intercept	I(1)	-7.38***	C	1981	Intercept only
	$LEXP_t$	-3.54	C,t	1993	Intercept only	I(1)	-8.33***	C	1982	Intercept only
	$LIMP_t$	-3.56	C,t	1990	Intercept only	I(1)	-5.89***	C	1984	Intercept only
Singapore	LWG_t	-3.91	C,t	1973	Trend and Intercept	I(1)	-6.89***	C	1974	Intercept only
	$LEXP_t$	-4.36	C,t	1974	Intercept only	I(1)	-6.92***	C	1974	Intercept only
	$LIMP_t$	-3.46	C,t	1973	Intercept only	I(1)	-6.78***	C	1974	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 26 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
South Africa	LWG_t	-2.45	C,t	2001	Trend only	I(1)	-4.98***	C	1985	Intercept only
	$LEXP_t$	-4.15	C,t	1984	Intercept only	I(1)	-7.83***	C	1980	Intercept only
	$LIMP_t$	-5.67**	C,t	1985	Trend and intercept	I(0)	-	-	-	
Thailand	LWG_t	-3.56	C,t	1994	Trend and intercept	I(1)	-7.60***	C	1997	Intercept only
	$LEXP_t$	-3.74	C,t	1990	Trend and intercept	I(1)	-7.97***	C	1988	Intercept only
	$LIMP_t$	-4.66	C,t	1989	Trend and intercept	I(1)	-8.17***	C	1998	Intercept only
Turkey	LWG_t	-4.01	C,t	1975	Trend and intercept	I(1)	-7.64***	C	1977	Intercept only
	$LEXP_t$	-5.04*	C,t	1980	Trend and intercept	I(1)	-10.09	C	1981	Intercept only
	$LIMP_t$	-5.23**	C,t	1979	Trend only	I(0)	-	-	-	
Venezuela	LWG_t	-4.58	C,t	1980	Intercept only	I(1)	-5.27***	C	1978	Intercept only
	$LEXP_t$	-4.44	C,t	1980	Intercept only	I(1)	-9.67***	C	1974	Intercept only
	$LIMP_t$	-5.34**	C,t	1983	Trend and intercept	I(0)	-	-	-	

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 27: Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (LFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Bangladesh	LWG_t	-3.24*	C,t	-4.13**	C,t	-	-	-	-
	LX_t	-2.84	C,t	-2.93	C,t	-6.39***	C	-7.21***	C
	LM_t	-1.86	C,t	-1.75	C,t	-8.34***	N	-8.30***	N
Benin	LWG_t	-2.21	C,t	-2.21	C,t	-8.75***	N	-8.73***	N
	LX_t	-2.81	C,t	-2.81	C,t	-6.17***	N	-6.18***	N
	LM_t	-3.35*	C,t	-3.20*	C,t	-8.92***	C	-15.16***	C
Bolivia	LWG_t	-2.58	C,t	-2.60	C,t	-7.99***	N	-8.15***	N
	LX_t	-0.79	C,t	-1.01	C,t	-5.66***	N	-5.66***	N
	LM_t	-2.28	C,t	-2.28	C,t	-7.56***	N	-7.57***	N
Botswana	LWG_t	-3.05**	C	-4.10**	C,t	-	-	-	-
	LX_t	-0.23	C,t	-0.33	C,t	-5.85***	C	-5.98***	C
	LM_t	-1.50	C,t	-1.40	C,t	-6.25***	C	6.24***	C
Burkina Fasu	LWG_t	-3.45*	C,t	-3.33*	C,t	-11.30***	N	-11.26***	N
	LX_t	-3.30*	C,t	-3.37*	C,t	-5.87***	N	-5.79***	N
	LM_t	-2.26	C,t	-2.33	C,t	-6.77***	N	-6.77***	N
Burundi	LWG_t	-3.01	C,t	-2.98	C,t	-6.55***	N	-9.76***	N
	LX_t	-3.29*	C,t	-3.39*	C,t	-11.63***	N	-11.53***	N
	LM_t	-1.61	C,t	-1.76	C,t	-6.77***	N	-6.79***	N

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (LFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Cameroon	LWG_t	-2.28	C,t	-2.01	C,t	-4.24***	N	-4.11***	N
	LX_t	-3.75**	C,t	-3.75**	C,t	-	-	-	-
	LM_t	-2.01	C,t	-2.00	C,t	-6.87***	N	-6.87***	N
Costa Rica	LWG_t	-2.55	C	-2.20	C	-	-	-	-
	LX_t	-1.76	C,t	-1.90	C,t	-	-	-	-
	LM_t	-2.10	C,t	-2.20	C,t	-	-	-	-
Côte d’ Ivoire	LWG_t	-2.80	C,t	-2.78	C,t	-4.91***	N	-4.92***	N
	LX_t	-2.25	C,t	-2.30	C,t	-6.93***	C	-7.18***	C
	LM_t	-2.36	C,t	-2.17	C,t	-8.81***	N	-8.82***	N
Dominic Republic	LWG_t	-2.39	C	-3.30**	C	-	-	-	-
	LX_t	-3.57**	C,t	-3.61**	C,t	-	-	-	-
	LM_t	-2.81	C,t	-2.89	C,t	-7.53***	N	-7.53***	N
Ecuador	LWG_t	-1.67	C	-1.83	C	-5.88***	N	-5.88***	N
	LX_t	-2.56	C,t	-2.23	C,t	-5.05***	N	-5.00***	N
	LM_t	-2.00	C,t	-2.06	C,t	-6.73***	C	-6.93***	C
El Salvador	LWG_t	-3.35**	C	-3.35**	C	-	-	-	-
	LX_t	-3.81**	C,t	-1.73	C,t	-6.28***	C	-6.26***	C
	LM_t	-1.51	C,t	-1.80	C,t	-5.31***	C	-5.31***	C

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (LFIs)

		Levels				**First difference**			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Gabon	LWG_t	-3.38*	C,t	-3.46*	C,t	-7.65***	N	-8.53***	N
	LX_t	-4.12**	C,t	-4.08**	C,t	-	-	-	-
	LM_t	-2.32	C,t	-2.28	C,t	-6.69***	N	6.69***	N
Ghana	LWG_t	-1.91	C,t	-4.82***	C,t	-	-	-	-
	LX_t	-1.80	C,t	-1.65	C,t	-7.89***	N	-7.89***	N
	LM_t	-1.96	C,t	-1.70	C,t	-8.18***	N	-8.18***	N
Guatemala	LWG_t	-2.52	C,t	-2.78	C,t	-5.58***	N	-5.53***	N
	LX_t	-1.33	C,t	-2.56	C,t	-12.63***	N	-11.76***	N
	LM_t	-1.71	C,t	-1.81	C,t	-7.88***	C	-7.84***	C
Honduras	LWG_t	-3.70**	C,t	-2.92	C,t	-	-	-	-
	LX_t	-3.12	C,t	-3.12	C,t	-8.32***	N	-8.31***	N
	LM_t	-2.19	C,t	-2.28	C,t	-7.11***	C	-7.11***	C
Jamaica	LWG_t	-2.12	C,t	-1.78	C,t	-4.30***	N	-4.33***	N
	LX_t	-3.14	C,t	-2.93	C,t	6.26***	N	7.61***	N
	LM_t	-2.70	C,t	-2.74	C,t	-6.45***	N	-6.44***	N
Kenya	LWG_t	-1.74	C,t	-1.99	C,t	-5.32***	N	-5.32***	N
	LX_t	-2.12	C,t	-2.30	C,t	-7.81***	N	-7.76***	N
	LM_t	-1.50	C,t	-1.17	C,t	-8.27***	N	-8.25***	N

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (LFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Mauritius	LWG_t	-2.28	C,t	-2.46	C,t	-	-	-	-
	LX_t	-2.09	C,t	-2.05	C,t	-8.89***	N	-8.74***	N
	LM_t	-2.58	C,t	-2.60	C,t	-4.01***	C	-9.47***	C
Niger	LWG_t	-1.44	C,t	-1.71	C,t	-1.97**	N	-6.40***	N
	LX_t	-3.32**	C	-3.31	C	-	-	-	-
	LM_t	-1.79	C,t	-1.94	C,t	-7.21***	N	-7.21***	N
Nigeria	LWG_t	-2.78	C,t	-4.45**	C,t	-8.45***	N	-14.74***	N
	LX_t	-2.29	C,t	-2.39	C,t	-6.76***	N	-6.76***	N
	LM_t	-1.67	C	-1.42	C	-5.18***	N	-5.18***	N
Panama	LWG_t	-3.55*	C,t	-2.41	C,t	-5.67***	N	-7.01***	N
	LX_t	0.11	C,t	-3.45*	C,t	-15.49***	C	-16.23***	C
	LM_t	-1.35	C,t	-2.17	C,t	-10.46***	C	-10.39***	C
Paraguay	LWG_t	-1.86	C,t	-1.79	C,t	-6.66***	N	-6.66***	N
	LX_t	-3.06	C,t	-3.11	C,t	-7.10***	N	-7.21***	N
	LM_t	-2.35	C,t	-2.68	C,t	-5.99***	C	5.99***	C
Senegal	LWG_t	-4.52***	C,t	-4.50***	C,t	-	-	-	-
	LX_t	-4.40***	C,t	-4.43***	C,t	-	-	-	-
	LM_t	-2.28	C,t	-2.29	C,t	-7.80***	C	-7.78***	C

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (LFIs)

		Levels				First difference			
Country	**Variables**	**ADF**	Test. Eq	**PP**	Test. Eq	**ADF**	Test eq.	**PP**	Test. Eq.
Sri Lanka	LWG_t	-3.75**	C,t	-2.02	C,t	-	-	-	-
	LX_t	-2.33	C,t	-2.33	C,t	-6.76***	N	6.76***	N
	LM_t	-3.50*	C,t	-3.37*	C,t	-9.12***	N	-8.99***	N
Syria	LWG_t	-7.91***	C	-7.85***	C	-	-	-	-
	LX_t	-2.97	C,t	-2.93	C,t	-7.35***	N	-9.20***	N
	LM_t	-2.77	C,t	-1.85	C,t	-2.36**	N	-6.49***	N
Togo	LWG_t	-2.83	C,t	-2.80	C,t	-7.61***	N	-8.84***	N
	LX_t	-5.17***	C,t	-5.17***	C,t	-	-	-	-
	LM_t	-3.81**	C,t	-3.73**	C,t	9.06***	N	10.08***	N
Tunisia	LWG_t	-1.19	C,t	-1.19	C,t	-2.49**	N	-2.41**	N
	LX_t	-2.61	C,t	-2.59	C,t	-10.33***	C	-10.05***	C
	LM_t	-1.84	C,t	-2.08	C,t	-6.82***	C	-6.83***	C
Uruguay	LWG_t	-3.67**	C,t	-2.51	C,t	-4.99***	N	-3.95***	N
	LX_t	-3.19*	C,t	-3.33*	C,t	-8.79***	C	-8.69***	C
	LM_t	-3.36*	C,t	-2.93	C,t	-5.88***	N	-5.91***	N

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant, t indicates trend, and N indicates no constant and no trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Bangladesh	LWG_t	-7.64***	C,t	1974	Trend and Intercept	I(0)	-	-	-	-
	$LEXP_t$	-4.92*	C,t	1974	Trend and Intercept	I(1)	-7.31***	C	1986	Intercept only
	$LIMP_t$	-4.77*	C,t	1973	Intercept only	I(1)	-9.37***	C	1978	Intercept only
Benin	LWG_t	-4.72*	C,t	1982	Intercept only	I(1)	-10.22***	C	1983	Intercept only
	$LEXP_t$	-4.07	C,t	1980	Intercept only	I(1)	-6.84***	C	1988	Intercept only
	$LIMP_t$	-5.64***	C,t	1983	Trend and Intercept	I(0)	-		-	
Bolivia	LWG_t	-4.57	C,t	1979	Intercept only	I(1)	-8.41***	C	1987	Intercept only
	$LEXP_t$	-5.14*	C,t	1981	Trend and Intercept	I(1)	-7.23***	C	1982	Intercept only
	$LIMP_t$	-3.19	C,t	1982	Intercept only	I(1)	-8.70***	C	1980	Intercept only
Botswana	LWG_t	-4.45	C,t	1973	Trend and Intercept	I(1)	-10.73***	C	1988	Intercept only
	$LEXP_t$	-3.18	C,t	1983	Trend only	I(1)	-7.13***	C	1984	Intercept only
	$LIMP_t$	-2.32	C,t	1990	Intercept only	I(1)	-7.15***	C	1974	Intercept only
Burkina Fasu	LWG_t	-4.21	C,t	1996	Intercept only	I(1)	-13.49***	C	1978	Intercept only
	$LEXP_t$	-4.15*	C,t	1996	Intercept only	I(1)	-6.78**	-	1994	-
	$LIMP_t$	-4.60*	C,t	1983	Intercept only	I(1)	-8.73***	C	1984	Intercept only
Burundi	LWG_t	-6.57***	C,t	1980	Intercept only	I(0)	--	-	-	-
	$LEXP_t$	-5.12*	C,t	2000	Trend and Intercept	I(1)	-12.82	C	1996	Intercept only
	$LIMP_t$	-6.38**	C,t	1992	Intercept only	I(0)	-	-	-	-

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Cameroon	LWG_t	-3.95	C,t	1988	Trend and Intercept	I(1)	-4.68**	C	1986	Intercept only
	$LEXP_t$	-5.51***	C,t	1979	Intercept only	I(0)	-	-	-	-
	$LIMP_t$	-4.81*	C,t	1987	Intercept only	I(1)	-8.62***	C	1988	Intercept only
Costa Rica	LWG_t	-4.12	C,t	1979	Trend and Intercept	I(1)	-8.59***	C	1980	Intercept only
	$LEXP_t$	-2.25	C,t	1996	Intercept only	I(1)	-7.31***	C	1998	Intercept only
	$LIMP_t$	-5.54**	C,t	1981	Trend and Intercept	I(0)	-	-	-	-
Côte d’Ivoire	LWG_t	-3.26	C,t	1982	Trend and Intercept	I(1)	-6.37***	C	1999	Intercept only
	$LEXP_t$	-5.51**	C,t	1986	Trend and Intercept	I(0)	-	-	-	-
	$LIMP_t$	-4.36	C,t	1982	Trend and Intercept	I(1)	-10.50***	C	1984	Intercept only
Dominic Republic	LWG_t	-4.43	C,t	1977	Trend and Intercept	I(1)	-8.85***	C	1975	Intercept only
	$LEXP_t$	-5.22**	C,t	1983	Intercept only	I(0)	-	-	-	-
	$LIMP_t$	-7.22***	C,t	1983	Trend and Intercept	I(0)	-	-	-	-
Ecuador	LWG_t	-2.94	C,t	1979	Trend and Intercept	I(1)	-6.53***	-	1982	Intercept only
	$LEXP_t$	-3.91	C,t	1984	Trend and Intercept	I(1)	-5.53***	-	1975	Intercept only
	$LIMP_t$	-4.22	C,t	1982	Intercept only	I(1)	-7.84***	C	1982	Intercept only
El Salvador	LWG_t	-4.31	C,t	1989	Intercept only	I(1)	10.16***	-	1979	Intercept only
	$LEXP_t$	-4.49	C,t	1979	Trend and Intercept	I(1)	-6.75***	C	1981	Intercept only
	$LIMP_t$	-3.15	C,t	1983	Intercept only	I(1)	-6.10***	C	1982	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Gabon	LWG_t	-4.82*	C,t	1985	Intercept only	I(1)	-8.83***	C	1986	Intercept only
	$LEXP_t$	-5.71***	C,t	1973	Intercept only	I(0)	-	-	-	-
	$LIMP_t$	-3.87	C,t	1986	Trend and Intercept	I(1)	-9.31***	C	1974	Intercept only
Ghana	LWG_t	-5.65***	C,t	1974	Intercept only	I(0)	-	-	-	-
	$LEXP_t$	-3.85	C,t	1977	Intercept only	I(1)	-9.55***	C	1985	Intercept only
	$LIMP_t$	-3.53	C,t	1977	Intercept only	I(1)	-12.31	C	1983	Intercept only
Guatemala	LWG_t	-4.11	C,t	1979	Trend and Intercept	I(1)	-6.49***	C	1982	Intercept only
	$LEXP_t$	-2.89	C,t	2003	Trend only	I(1)	-13.38	C	1987	Intercept only
	$LIMP_t$	-3.11	C,t	1992	Trend only	I(1)	-8.99	C	1986	Intercept only
Honduras	LWG_t	-4.78*	C,t	1982	Trend only	I(1)	-6.91***	C	1980	Intercept only
	$LEXP_t$	-4.52	C,t	1986	Intercept only	I(1)	-9.03***	C	1996	Intercept only
	$LIMP_t$	-4.50	C,t	1981	Intercept only	I(1)	-8.18***	C	1982	Intercept only
Jamaica	LWG_t	-3.69	C,t	1989	Trend and Intercept	I(1)	-4.98***	C	1976	Intercept only
	$LEXP_t$	-4.32	C,t	1973	Intercept only	I(1)	-7.87***	C	1974	Intercept only
	$LIMP_t$	-4.87	C,t	1975	Trend and Intercept	I(1)	-7.30***	C	1976	Intercept only
Kenya	LWG_t	-3.27	C,t	1988	Trend and Intercept	I(1)	-5.74	C	1991	Intercept only
	$LEXP_t$	-3.59	C,t	1986	Intercept only	I(1)	-8.49***	C	1992	Intercept only
	$LIMP_t$	-4.01	C,t	1981	Intercept only	I(1)	-9.46***	C	1989	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break Specification**
Mauritius	LWG_t	-4.77	C,t	1977	Trend and Intercept	I(1)	11.85***	C	1980	Intercept only
	$LEXP_t$	-4.64	C,t	1983	Trend and Intercept	I(1)	-10.38***	C	1987	Intercept only
	$LIMP_t$	-4.63*	C,t	1973	Intercept only	I(1)	-10.04***	C	1984	Intercept only
Niger	LWG_t	-4.72	C,t	1982	Trend and Intercept	I(1)	-7.35***	C	1984	Intercept only
	$LEXP_t$	-4.50	C,t	1981	Trend and Intercept	I(1)	-8.33***	C	1978	Intercept only
	$LIMP_t$	-3.66	C,t	1981	Intercept only	I(1)	-8.35***	C	1984	Intercept only
Nigeria	LWG_t	-5.68**	C,t	1978	Trend and Intercept	I(0)	-	-	-	-
	$LEXP_t$	-4.00	C,t	1993	Trend and Intercept	I(1)	-8.48***	C	1999	Intercept only
	$LIMP_t$	-2.92	C,t	1992	Trend and Intercept	I(1)	-6.13***	C	1995	Intercept only
Panama	LWG_t	-5.85***	C,t	1987	Trend and Intercept	I(0)				
	$LEXP_t$	-7.25***	C,t	1995	Trend and Intercept	I(0)				
	$LIMP_t$	-5.22**	C,t	1985	Trend and Intercept	I(0)				
Paraguay	LWG_t	-4.20	C,t	1981	Trend and Intercept	I(1)	7.47***	C	1982	Intercept only
	$LEXP_t$	-4.51	C,t	1980	Intercept only	I(1)	-8.44***	C	1989	Intercept only
	$LIMP_t$	-3.43	C,t	1982	Trend and Intercept	I(1)	6.66***	C	1999	Intercept only
Senegal	LWG_t	-4.62	C,t	1988	Trend and Intercept	I(1)	-8.62***	C	1982	Intercept only
	$LEXP_t$	-6.78***	C,t	1992	Trend and Intercept	I(0)	-	-	-	-
	$LIMP_t$	-3.84	C,t	1992	Trend and Intercept	I(1)	-9.49***	C	1994	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 27 (Continued): Breakpoint Unit Root Test results of log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

		Levels					First Difference			
Country	**Variables**	**Additive outlier**	**Test. Eq**	**Break date**	**Break Specification**	**Classification**	**Additive outlier**	**Test. Eq.**	**Break date**	**Break specification**
Sri Lanka	LWG_t	-4.60	C,t	1984	Intercept only	I(1)	-5.14***	C	1979	Intercept only
	$LEXP_t$	-3.38	C,t	1991	Intercept only	I(1)	-7.98***	C	1978	Intercept only
	$LIMP_t$	-4.35	C,t	1973	Intercept and trend	I(1)	-11.49***	C	1978	Intercept only
Syria	LWG_t	-9.49***	C,t	1982	Intercept only	I(0)	-	-	-	-
	$LEXP_t$	-5.31**	C,t	1984	Intercept and trend	I(0)	-	-	-	-
	$LIMP_t$	-4.27	C,t	1984	Intercept and trend	I(1)	-7.25***	C	1988	Intercept only
Togo	LWG_t	-3.69	C,t	1986	Trend only	I(1)	10.66***	C	1978	Intercept only
	$LEXP_t$	-5.93***	C,t	1971	Trend only	I(0)	-	-	-	-
	$LIMP_t$	-5.65***	C,t	1976	Intercept only	I(0)	-	-	-	-
Tunisia	LWG_t	-2.48	C,t	1981	Intercept and trend	I(1)	-6.20***	C	2009	Intercept only
	$LEXP_t$	-5.31**	C,t	1981	Intercept and trend	I(0)	-	-	-	-
	$LIMP_t$	-3.63	C,t	1984	Intercept and trend	I(1)	-7.95***	C	1974	Intercept only
Uruguay	LWG_t	-4.93**	C,t	1980	Intercept only	I(0)	-	-	-	-
	$LEXP_t$	-5.52**	C,t	1975	Intercept and trend	I(0)	-	-	-	-
	$LIMP_t$	-3.88	C,t	1979	Intercept only	I(1)	-6.87***	C	1983	Intercept only

Note: *, **, and * denote the rejection of the null hypothesis at 10%, 5% and 1% levels respectively. C indicates constant and t indicates trend. Welfare gains are from case 3.**

Appendix 28: Johansen procedure for testing co-integration between log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

	Trace test hypothesis/ test statics			Maximum eigenvalue test hypothesis/ test statistics			Optimal lag length by	Optimal lag length	Deterministic trend
Country	$r = 0$	$r \leq 1$	$r \leq 2$	$r = 0$	$r \leq 1$	$r \leq 2$	**AIC**	**by SC**	**specification**[a]
Argentina	39.98**	13.98	1.26	25.99**	12.71	1.26	3 lags	1 lag	5
Brazil	64.35***	20.84	3.39	43.51***	17.44	3.39	3 lags	1 lag	4
Chile	31.42**	8.96	0.16	22.45**	8.80	0.16	2 lags	2 lag	3
China	47.04**	27.41**	12.06	19.62	15.34	12.06	3 lags	1 lag	4
Columbia	41.06**	17.79	1.37	23.26	16.42	1.37	2 lag	1 lag	5
Egypt	36.22**	15.54	1.61	20.68	13.92	1.61	3 lags	1 lag	5
Hong Kong	33.99	11.79	0.56	22.19	11.23	0.56	2 lags	1 lag	5
India	52.73***	14.75	2.74	37.98***	12.00	2.74	4 lags	1 lag	5
Indonesia	83.46***	34.49***	2.55	48.97***	31.93***	2.55	3 lags	2 lags	5
Israel	35.39**	7.03	1.37	28.35**	5.66	1.37	3 lags	1 lag	5
Korea	47.81***	14.30	2.28	33.51***	12.01	2.28	2 lags	1 lag	5
Malaysia	45.28**	21.37	5.76	23.91	15.61	5.76	2 lags	1 lag	4

Note: ** and ** denotes the rejection of the null of $r = 0$ (no co-integrating relationship) and $r = 1$ (one co-integrating relationship) at 5% and 1% levels of significance. AIC indicates (Akaike information criterion) and SC (Schwarz criterion). We employ optimal lag length based on AIC.**

a **Deterministic trend specification:**

1. No intercept or trend in Cointegration equation (CE) and Vector autoregressive model (VAR)
2. Intercept (no trend) in CE – no intercept in VAR
3. Intercept (no trend) in CE and VAR
4. Intercept and trend CE – no trend in VAR
5. Intercept and Trend in CE –linear trend in VAR

Appendix 28 (Continued): Johansen procedure for testing co-integration between log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for more financially integrated economies (MFIs)

	Trace test hypothesis/ test statics			Maximum eigenvalue test hypothesis/ test statistics			Optimal lag (p) length	Optimal lag (p)	Deterministic trend
Country	$r = 0$	$r \leq 1$	$r \leq 2$	$r = 0$	$r \leq 1$	$r \leq 2$	by AIC	length by SC	specification[a]
Mexico	48.64***	15.45	2.47	33.19***	12.97	2.47	3 lags	2 lags	5
Morocco	31.19**	9.68	1.23	21.51**	8.45	1.23	2 lags	1 lag	3
Pakistan	59.32***	21.61	6.47	37.71***	15.13	6.47	3 lags	1 lag	4
Peru	56.03***	25.55	5.99	30.48**	19.56**	5.99	4 lags	2 lags	3
Philippines	41.03	24.60	8.85	16.42	15.74	8.85	1 lags	1 lags	4
Singapore	51.02***	22.82***	1.72	28.20***	21.09***	1.72	4 lags	1 lag	3
South Africa	38.84***	9.28	1.61	29.55	7.67	1.61	1 lag	1 lag	3
Thailand	41.74***	15.86**	0.21	25.87***	15.64**	0.21	2 lags	1 lag	3
Turkey	50.15***	24.62	6.95	25.53	17.66	6.95	2 lags	1 lags	4
Venezuela	45.17**	17.65	7.64	27.52**	10.01	7.64	2 lags	1 lag	4

Note: ** and ** denotes the rejection of the null of $r = 0$ (no co-integrating relationship) and $r = 1$ (one co-integrating relationship) at 5% and 1% levels of significance. AIC indicates (Akaike information criterion) and SC (Schwarz criterion). We employ optimal lag length based on AIC.**

a **Deterministic trend specification:**

1. No intercept or trend in Cointegration equation (CE) and Vector autoregressive model (VAR)
2. Intercept (no trend) in CE – no intercept in VAR
3. Intercept (no trend) in CE and VAR
4. Intercept and trend CE – no trend in VAR
5. Intercept and Trend in CE –linear trend in VAR

Appendix 29: Johansen procedure for testing co-integration between log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

Trace test hypothesis/ test statics				Maximum eigenvalue test hypothesis/ test statistics			Optimal lags by AIC	Optimal lags by SC	Deterministic trend specification[a]
Country	$r=0$	$r\leq 1$	$r\leq 2$	$r=0$	$r\leq 1$	$r\leq 2$			
Bangladesh	34.72**	5.58	0.43	29.13***	5.14	0.43	3 lags	3 lags	3
Benin	30.22**	7.14	0.45	23.07**	6.69	0.45	2 lags	1 lag	3
Bolivia	54.38***	10.50	3.22	43.88***	7.27	3.22	4 lags	1 lag	4
Botswana	70.98***	10.79	0.49	60.18***	10.30	0.49	4 lag	1 lag	5
Burkina Fasu	38.25	14.71	1.05	23.53	13.65	1.05	4 lag	1 lag	4
Burundi	53.83***	16.19**	0.005	37.64***	16.18**	0.005	1 lag	1 lag	3
Cameroon	39.51***	3.08	0.28	36.43***	2.79	0.28	3 lags	1 lag	3
Costa Rica	46.86***	16.19	2.06	30.67***	14.12	2.06	1 lags	1 lag	5
Côte d'Ivoire	35.85***	6.44	2.62	29.40	3.82	2.62	4 lag	1 lag	3
Dominic Republic	64.09***	32.85***	7.83	31.24***	25.01***	7.83	1 lag	1 lag	4
Ecuador	30.04	8.17	0.46	21.86	7.71	0.46	2 lags	2 lags	4
El Salvador	78.60***	14.07	3.07	64.53***	10.99	3.07	1 lag	1 lag	4

Note: ** and ** denotes the rejection of the null of $r = 0$ (no co-integrating relationship) and $r = 1$ (one co-integrating relationship) at 5% and 1% levels of significance. AIC indicates (Akaike information criterion) and SC (Schwarz criterion). We employ optimal lag length based on AIC.**

a **Deterministic trend specification:**
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Appendix 29 (Continued): Johansen procedure for testing co-integration between log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

Trace test hypothesis/ test statics				Maximum eigenvalue test hypothesis/ test statistics			Optimal lags by AIC	Optimal lags by SC	Deterministic trend specification[a]
Country	$r = 0$	$r \leq 1$	$r \leq 2$	$r = 0$	$r \leq 1$	$r \leq 2$			
Gabon	52.82***	21.39	3.11	31.43***	18.28	3.11	1 lag	1 lag	4
Ghana	28.95	4.15	0.027	24.79**	4.12	0.07	3 lags	1 lag	3
Guatemala	30.48**	6.83	1.27	23.64**	5.56	1.27	3 lags	1 lag	3
Honduras	37.87	14.94	6.77	22.93	8.16	6.77	2 lags	2 lags	4
Jamaica	39.09	14.50	1.34	24.58	13.16	1.34	2 lags	1 lag	4
Kenya	32.99	10.62	3.52	22.37	7.09	3.52	2 lags	1 lag	4
Mauritius	13.92	6.01	0.31	7.90	5.70	0.31	3 lags	1 lag	3
Niger	38.54	10.62	0.09	27.91**	10.52	0.09	1 lags	1 lag	4
Nigeria	48.79***	9.16	2.87	36.62***	6.29	2.87	1 lag	1 lag	3
Panama	85.97***	29.73***	6.53***	56.23***	23.19***	6.53***	4 lags	1 lag	5
Paraguay	46.34**	20.40	2.79	25.93**	17.60	2.79	1 lag	1 lag	4
Senegal	38.94***	11.43	0.53	27.51**	10.89	0.53	2 lag	1 lag	3

Note: ** and ** denotes the rejection of the null of $r = 0$ (no co-integrating relationship) and $r = 1$ (one co-integrating relationship) at 5% and 1% levels of significance. AIC indicates (Akaike information criterion) and SC (Schwarz criterion). We employ optimal lag length based on AIC.**

a **Deterministic trend specification:**

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Appendix 29 (Continued): Johansen procedure for testing co-integration between log of welfare gains (LWG_t), exports ($LEXP_t$), and imports ($LIMP_t$) for less financially integrated economies (LFIs)

	Trace test hypothesis/ test statics			Maximum eigenvalue test hypothesis/ test statistics			Optimal lags by AIC	Optimal lags by SC	Deterministic trend specification[a]
Country	$r = 0$	$r \leq 1$	$r \leq 2$	$r = 0$	$r \leq 1$	$r \leq 2$			
Sri Lanka	52.19***	14.14	2.36	38.05***	11.77	2.36	1 lag	1 lag	3
Syria	66.85***	21.63	1.67	45.21***	19.96**	1.67	2 lags	1 lag	4
Togo	75.18***	26.41**	8.87	48.77**	17.53	8.87	3 lags	1 lag	4
Tunisia	46.47***	15.64	0.61	30.83***	15.02	0.61	2 lags	1 lag	5
Uruguay	56.53***	30.00**	5.84	26.52**	24.16***	5.84	3 lags	1 lag	4

Note: ** and ** denotes the rejection of the null of $r = 0$ (no co-integrating relationship) and $r = 1$ (one co-integrating relationship) at 5% and 1% levels of significance. AIC indicates (Akaike information criterion) and SC (Schwarz criterion). We employ optimal lag length based on AIC.**

a **Deterministic trend specification:**

1. No intercept or trend in Co-integration equation (CE) and Vector autoregressive model (VAR)
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Appendix 30: Country wise Vector Error Correction Model Estimates for MFIs

	Long run Contemporaneous relationship: Brazil **LWG=-2.12+0.12LEXP+0.20LIMP-0.02TREND+et** **(0.06)* (0.02)*****			**Long run Contemporaneous relationship: Egypt** **LWG=-0.85-0.32LEXP+0.20LIMP-0.01TREND+et** **(0.06)*** (0.06)*****			**Long run Contemporaneous relationship: India** **LWG=-0.87+0.18LEXP-0.03LIMP-0.006TREND+et** **(0.04)*** (0.02)**			**Long run Contemporaneous relationship: Indonesia** **LWG=-3.12-0.15LEXP+0.65LIMP-0.03Trend+et** **(0.07)** (0.06)*****			**Long run Contemporaneous relationship: Israel** **LWG=-3.45-1.60LEXP+1.98LIMP-0.006TREND+et** **(0.37)*** (0.34)*****		
	Δ(LWG)	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*
ECM(-1)	-0.016 (0.09)	1.52*** (0.33)	2.54*** (0.47)	-0.073 (0.09)	-1.65*** (0.51)	-0.28 (0.53)	-0.357*** (0.11)	2.148** (0.88)	-2.632* (1.51)	0.169*** (0.02)	0.172 (0.22)	0.801*** (0.27)	0.128*** (0.12)	-0.156 (0.15)	-0.158 (0.13)
Δ(LWG(-1))	0.31* (0.16)	1.59** (0.59)	1.30 (0.84)	0.338** (0.16)	2.24** (0.90)	0.59 (0.93)	0.228 (0.15)	-0.584 (1.19)	2.720 (2.03)	-0.175 (0.13)	1.574 (1.37)	1.265 (1.66)	-0.097 (0.19)	0.719 (0.84)	2.921*** (0.75)
Δ(LWG(-2))	-0.23 (0.17)	-0.69 (0.62)	-0.45 (0.88)	-0.32* (0.17)	1.26 (0.98)	3.64*** (1.02)	0.046 (0.14)	-2.058* (1.14)	-0.413 (1.94)	-0.193* (0.10)	3.087*** (1.05)	2.315* (1.27)	-0.360* (0.18)	1.731** (0.83)	2.352*** (0.74)
Δ(LWG(-3))							-0.088 (0.13)	-1.971* (1.05)	4.000** (1.79)						
Δ(LEXP(-1))	-0.0013 (0.03)	0.13 (0.12)	0.42** (0.17)	0.041 (0.03)	0.36** (0.17)	0.14 (0.17)	0.007 (0.02)	0.110 (0.19)	0.337 (0.33)	-0.047*** (0.01)	-0.106 (0.18)	-0.483** (0.22)	-0.089 (0.6)	0.025 (0.27)	0.301 (0.24)
Δ(LEXP(-2))	0.032 (0.03)	-0.08 (0.12)	0.27 (0.18)	-0.025 (0.03)	0.16 (0.17)	0.45** (0.18)	-0.043 (0.02)	-0.027 (0.19)	-0.299 (0.34)	-0.022 (0.02)	0.023 (0.21)	0.387 (0.26)	0.055 (0.05)	-0.019 (0.23)	0.175 (0.20)
Δ(LEXP(-3))							-0.071*** (0.02)	0.038 (0.18)	0.140 (0.32)						
Δ(LIMP(-1))	0.017 (0.02)	-0.042 (0.10)	-0.17 (0.15)	0.039 (0.02)	-0.34** (0.15)	-0.32** (0.15)	-0.023* (0.01)	-0.068 (0.09)	-0.608*** (0.15)	0.00009 (0.01)	-0.153 (0.15)	-0.092 (0.18)	0.191** (0.07)	-0.448 (0.33)	-0.908*** (0.30)
Δ(LIMP(-2))	0.007 (0.03)	-0.105 (0.11)	-0.11 (0.16)	-0.0022 (0.02)	-0.11 (0.15)	-0.30* (0.16)	-0.021 (0.01)	0.002 (0.12)	-0.331 (0.21)	0.018 (0.01)	-0.172 (0.13)	-0.216 (0.16)	-0.025 (0.05)	-0.336 (0.23)	-0.756*** (0.21)
Δ(LIMP(-3))							0.0001 (0.014)	0.100 (0.11)	-0.141 (0.19)						
C	0.003 (0.005)	0.109*** (0.02)	0.11*** (0.02)	-0.00106 (0.02)	-0.20 (0.12)	-0.04 (0.12)	-0.005 (0.005)	0.006 (0.03)	-0.120* (0.06)	0.036*** (0.008)	-0.128 (0.08)	-0.059 (0.10)	0.0063 (0.01)	0.180*** (0.04)	0.127*** (0.04)
TREND				0.0013 (0.001)	0.022** (0.0103)	0.0035 (0.0106)	0.001 (0.0004)	0.003 (0.003)	0.011* (0.005)	-0.001*** (0.0002)	0.004 (0.002)	0.004 (0.003)	-0.00014 (0.0002)	-0.002* (0.001)	-0.0012 (0.001)
D1	-0.001 (0.01)	0.0014 (0.05)	-0.14* (0.07)	-0.0034 (0.02)	-0.12 (0.14)	-0.028 (0.15)	-0.014* (0.006)	-0.018 (0.05)	0.096 (0.09)	0.026** (0.01)	0.014 (0.11)	0.076 (0.14)	-0.034** (0.01)	0.026 (0.07)	0.239*** (0.06)
D2	0.013 (0.01)	-0.29*** (0.05)	-0.107 (0.07)	-0.053 (0.04)	-0.53** (0.24)	-0.0068 (0.25)	0.008 (0.007)	-0.066 (0.06)	-0.240** (0.10)	0.031 (0.01)	0.275 (0.16)	0.347 (0.20)	-0.0076 (0.01)	-0.069 (0.24)	-0.019 (0.05)
D3	-0.026 (0.01)*	-0.0038 (0.05)	-0.12 (0.07)				-0.005 (0.006)	0.066 (0.05)	0.004 (0.09)	-0.061*** (0.01)	0.230* (0.12)	0.011 (0.15)	-0.031* (0.01)	0.070 (0.06)	0.087 (0.06)
Multivariate residual diagnostics															
Normality (Jarque-Bera Test)	8.38	0.21		1.95	0.92		1.43	0.83		1.03	0.98		10.25	0.11	
Lag 1 Autocorrelation (LM Test)	12.89	0.16		5.53	0.78		6.58	0.68		15.55	0.07		6.45	0.91	
Lag 2 Autocorrelation (LM test)	7.98	0.53		9.18	0.42		12.70	0.17		17.15	0.04		4.01	0.91	
White Heteroscedasticity Test	89.39	0.80		131.53	0.06		141.29	0.68		138.05	0.06		128.46	0.16	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 30 (Continued): Country wise Vector Error Correction Model Estimates for MFIs

	Long run Contemporaneous relationship: Korea LWG=-6.51-0.93LEXP+1.67LIMP-0.04TREND+et (0.16)*** (0.30)***			**Long run Contemporaneous relationship: Malaysia** LWG=-2.67+0.75LEXP-0.39LIMP-0.02TREND+et (0.21)*** (0.17)**			**Long run Contemporaneous relationship: Singapore** LWG=-0.60-0.31LEXP+0.41LIMP +et (0.07)* (0.09)***			**Long run Contemporaneous relationship: Thailand** LWG=-0.38-0.31LEXP+0.41LIMP+et (0.06)* (0.02)***		
	Δ(LWG)	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*
ECM(-1)	0.051*** (0.01)	-0.110 (0.09)	0.317*** (0.10)	-0.024 (0.03)	0.697*** (0.14)	0.538*** (0.19)	-0.312** (0.14)	0.379 (0.84)	1.511* (0.81)	-0.083 (0.06)	0.632** (0.29)	1.396*** (0.32)
Δ(LWG(-1))	-0.246** (0.09)	0.064 (0.59)	2.073*** (0.65)	0.529*** (0.14)	1.590** (0.67)	4.167*** (0.85)	0.383** (0.18	3.293*** (1.07)	3.472*** (1.03)	0.030 (0.16)	0.878 (0.73)	3.101*** (0.82)
Δ(LWG(-2))							-0.237 (0.22)	-0.576 (1.29)	-0.657 (1.24)			
Δ(LWG(-3))							-0.431** (0.16)	-1.140 (0.93)	-1.220 (0.90)			
Δ(LEXP(-1))	0.037 (0.02)	0.400** (0.17)	0.126 (0.19)	0.005 (0.03)	0.185 (0.18)	0.418* (0.22)	0.102 (0.06)	-0.263 (0.37)	-0.302 (0.35)	0.040 (0.03)	-0.327* (0.17)	-0.341* (0.19)
Δ(LEXP(-2))							0.068 (0.05)	-0.537 (0.32)	-0.323 (0.30)			
Δ(LEXP(-3))							0.040 (0.05)	-0.324 (0.30)	-0.171 (0.28)			
Δ(LIMP(-1))	-0.042* (0.02)	-0.290** (0.12)	0.029 (0.13)	-0.070** (0.03)	-0.442*** (0.14)	-0.578*** (0.18)	-0.086 (0.06)	-0.003 (0.36)	0.026 (0.35)	-0.053* (0.02)	0.184 (0.12)	-0.016 (0.13)
Δ(LIMP(-2))							-0.004 (0.05)	0.200 (0.30)	0.139 (0.29)			
Δ(LIMP(-3))							0.025 (0.04)	0.466 (0.28)	0.218 (0.27)			
C	0.016 (0.01)	0.238*** (0.06)	0.088 (0.06)	0.011** (0.004)	0.092*** (0.02)	0.057** (0.02)	0.048*** (0.01)	0.035 (0.06)	0.010 (0.06)	0.012** (0.004)	0.095*** (0.02)	0.089*** (0.02)
TREND	0.0002 (0.001)	-0.004** (0.001)	-0.001 (0.001)									
D1	-0.007 (0.01)	0.095 (0.11)	0.105 (0.12)	-0.006 (0.007)	-0.058 (0.03)	0.024 (0.04)	-0.024* (0.01)	0.168 (0.08)	0.115 (0.07)	-0.039** (0.01)	-0.031 (0.06)	-0.015 (0.07)
D2	-0.013 (0.01)	-0.090 (0.06)	-0.067 (0.07)	-0.016 (0.009)	0.024 (0.04)	0.038 (0.05)	-0.062*** (0.01)	0.101 (0.09)	0.120 (0.09)	-0.040** (0.01)	0.092 (0.08)	0.088 (0.09)
D3	0.002 (0.01)	-0.036 (0.07)	-0.005 (0.07)	-0.016 (0.012)	-0.141** (0.06)	-0.072 (0.07)						
Multivariate residual diagnostics												
Normality (Jarque-Bera Test)	6.55	0.36		6.65	0.35		7.87	0.24		9.33	0.15	
Lag 1 Autocorrelation (LM Test)	7.23	0.61		17.70	0.03		3.96	0.91		6.23	0.71	
Lag 2 Autocorrelation (LM test)	4.63	0.86		9.67	0.37		9.30	0.40		5.04	0.83	
White Heteroscedasticity Test	106.32	0.01		71.98	0.28		142.15	0.25		73.76	0.10	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 31: Country wise Vector Error Correction Model Estimates for LFIs

	Long run Contemporaneous relationship: Bolivia **LWG=-1.76-0.04LEXP+0.42LIMP-0.016TREND+et** **(0.04) (0.05)*****			**Long run Contemporaneous relationship: Botswana** **LWG=3.47+1.24LEXP-1.6-67LIMP-0.01TREND+et** **(0.18)*** (0.22)*****			**Long run Contemporaneous relationship: El Salvadore** **LWG=0.05-0.003LEXP+0.03LIMP-0.002TREND+et** **(0.16)*** (0.30)*** (0.0005)*****			**Long run Contemporaneous relationship: Guatemala** **LWG=0.03+0.56LEXP-0.49LIMP+et** **(0.18)*** (0.13)*****		
	Δ(LWG)	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*
ECM(-1)	0.139* (0.07)	0.191 (0.32)	1.863*** (0.26)	-0.189*** (0.03)	0.325*** (0.11)	0.093 (0.12)	-1.069*** (0.10)	1.481 (0.92)	0.700 (0.75)	-0.052 (0.06)	1.145*** (0.28)	0.408* (0.22)
Δ(LWG(-1))	-0.558*** (0.16)	-0.828 (0.73)	-1.374** (0.59)	-0.528*** (0.06)	-0.290 (0.23)	0.322 (0.26)				0.137 (0.15)	-0.551 (0.75)	1.718*** (0.58)
Δ(LWG(-2))	-0.196 (0.14)	0.514 (0.62)	0.763 (0.50)	-0.353*** (0.07)	-0.158 (0.27)	0.325 (0.31)				-0.201 (0.18)	0.480 (0.85)	0.561 (0.66)
Δ(LWG(-3))	0.291** (0.13)	-0.659 (0.62)	1.411*** (0.50)	-0.269*** (0.06)	0.154 (0.24)	0.327 (0.28)						
Δ(LEXP(-1))	0.044 (0.03)	-0.034 (0.16)	0.092 (0.13)	-0.087** (0.04)	0.027 (0.15)	0.050 (0.17)				-0.035 (0.03)	-0.379** (0.16)	0.305** (0.12)
Δ(LEXP(-2))	-0.019 (0.03)	-0.252 (0.16)	0.203 (0.13)	-0.097** (0.04)	0.148 (0.17)	0.286 (0.19)				-0.057* (0.03)	-0.130 (0.15)	0.210* (0.11)
Δ(LEXP(-3))	0.048 (0.04)	-0.171 (0.18)	0.207 (0.14)	-0.105* (0.05)	0.095 (0.19)	0.430* (0.21)						
Δ(LIMP(-1))	0.025 (0.02)	0.004 (0.13)	-0.103 (0.10)	0.218*** (0.05)	-0.457** (0.20)	-0.323 (0.23)				0.019 (0.05)	-0.429* (0.23)	-0.656*** (0.18)
Δ(LIMP(-2))	-0.066** (0.02)	-0.019 (0.12)	-0.190* (0.09)	0.166*** (0.05)	-0.423** (0.19)	-0.400* (0.22)				0.052 (0.04)	-0.394** (0.19)	-0.394** (0.14)
Δ(LIMP(-3))	-0.007 (0.02)	-0.116 (0.12)	-0.190* (0.09)	0.102* (0.05)	0.035 (0.19)	-0.337 (0.22)						
C	0.012* (0.007)	0.109*** (0.03)	0.140*** (0.02)	0.059* (0.02)	0.412*** (0.10)	0.325** (0.12)	0.005* (0.002)	0.044* (0.02)	0.062*** (0.01)	0.003 (0.007)	0.113*** (0.03)	0.082*** (0.02)
TREND				-0.001 (0.0008)	-0.011*** (0.003)	-0.006 (0.003)						
D1	-0.108*** (0.02)	-0.202** (0.10)	- 0.240*** (0.08)	-0.044** (0.01)	-0.110 (0.06)	-0.156** (0.07)	-0.014 (0.01)	-0.070 (0.11)	0.050 (0.09)	-0.057*** (0.01)	-0.101 (0.08)	-0.053 (0.06)
D2	0.128*** (0.03)	-0.132 (0.16)	0.2578 (0.13)	-0.030 (0.01)	0.154** (0.06)	0.001 (0.07)	-0.105*** (0.01)	0.009 (0.10)	-0.167** (0.08)	0.004 (0.02)	-0.050 (0.11)	0.079 (0.08)
D3	-0.115*** (0.03)	-0.196 (0.16)	- 0.992*** (0.13)	-0.048*** (0.01)	-0.107* (0.05)	-0.082 (0.06)	0.029*** (0.01)	0.137 (0.08)	0.088 (0.07)	0.008 (0.01)	0.045 (0.07)	0.033 (0.06)
Multivariate residual diagnostics												
Normality (Jarque-Bera Test)	7.39	0.28		4.86	0.56		5.78	0.44		2.04	0.85	
Lag 1 Autocorrelation (LM Test)	4.33	0.88		13.73	0.13		1.59	0.99		6.11	0.72	
Lag 2 Autocorrelation (LM test)	10.69	0.29		9.70	0.37		-	-		8.13	0.52	
White Heteroscedasticity Test	109.52	0.96		178.79	0.054		38.81	0.12		124.34	0.06	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 31 (Continued): Country wise Vector Error Correction Model Estimates for LFIs

	Long run Contemporaneous relationship: Paraguay **LWG=-1.73+0.19LEXP+0.29LIMP-0.03TREND+et** **(0.10)* (0.17)*** **			**Long run Contemporaneous relationship: Sri Lanka** **LWG=0.24-0.72LEXP+0.72LIMP+et** **(0.11)*** (0.09)*** **		
	Δ(LWG)	*Δ(LEXP)*	*Δ(LIMP)*	*Δ(LWG)*	*Δ(LEXP)*	*Δ(LIMP)*
ECM(-1)	-0.039 (0.04)	0.925*** (0.25)	0.898*** (0.21)	-0.051*** (0.01)	-0.296* (0.17)	0.564** (0.27)
Δ(LWG(-1))						
Δ(LWG(-2))						
Δ(LWG(-3))						
Δ(LEXP(-1))						
Δ(LEXP(-2))						
Δ(LEXP(-3))						
Δ(LIMP(-1))						
Δ(LIMP(-2))						
Δ(LIMP(-3))						
C	0.006 (0.005)	0.088*** (0.03)	0.124*** (0.02)	0.009*** (0.002)	-0.018 (0.02)	0.025 (0.04)
TREND						
D1	-0.001 (0.02)	-0.240* (0.13)	-0.396*** (0.11)	-0.016*** (0.005)	0.002 (0.05)	-0.005 (0.08)
D2	-0.022 (0.02)	-0.390*** (0.14)	-0.082 (0.11)	0.003 (0.004)	0.111** (0.04)	-0.013 (0.07)
D3	-0.041 (0.02)	0.0001 (0.15)	0.071 (0.12)	0.003 (0.006)	0.187*** (0.05)	0.226** (0.09)
Multivariate residual diagnostics						
Normality (Jarque-Bera Test)	9.30	0.15		10.05	0.12	
Lag 1 Autocorrelation (LM Test)	7.51	0.58		9.92	0.35	
Lag 2 Autocorrelation (LM test)	-	-		-	-	
White Heteroscedasticity Test	24.58	0.74		32.43	0.34	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 32: Country wise Vector Autoregressive Estimates for MFIs

Argentina				***Chile***				***China***				***Columbia***			
	Δ(LWG)	*(LEXP)*	*Δ(LIMP)*		*Δ(LWG)*	*Δ(LEXP)*	*(LIMP)*		*(LWG)*	*Δ(LEXP)*	*(LIMP)*		*Δ(LWG)*	*(LEXP)*	*Δ(LIMP)*
Δ(LWG(-1))	0.813*** (0.15)	-0.998 (1.39)	8.732*** (2.35)	*Δ(LWG(-1))*	0.379** (0.13)	-1.621 (1.24)	0.986 (1.39)	*(LWG(-1))*	0.927*** (0.15)	-1.984 (1.38)	0.065 (2.12)	*Δ(LWG(-1))*	-0.063 (0.16)	0.662 (0.74)	2.905*** (0.91)
Δ(LWG(-2))	-0.495** (0.19)	5.445*** (1.75)	1.604 (2.96)	*Δ(LWG(-2))*				*(LWG(-2))*	-0.244 (0.22)	1.981 (2.00)	-0.116 (3.09)	*Δ(LWG(-2))*			
Δ(LWG(-3))	0.287 (0.19)	-0.153 (1.73)	3.793 (2.92)	*Δ(LWG(-3))*				*(LWG(-3))*	-0.274 (0.22)	-0.316 (2.03)	0.238 (3.12)	*Δ(LWG(-3))*			
Δ(LWG(-4))				*Δ(LWG(-4))*				*(LWG(-4))*	0.436*** (0.14)	0.002 (0.001)	-0.101 (1.97)	*Δ(LWG(-4))*			
(LEXP(-1))	0.022 (0.01)	0.645*** (0.17)	-0.376 (0.29)	*Δ(LEXP(-1))*	-0.004 (0.1)	-0.113 (0.16)	-0.209 (0.15)	*Δ(LEXP(-1))*	-0.013 (0.02)	-0.034 (0.21)	0.129 (0.33)	*(LEXP(-1))*	0.008 (0.009)	0.958*** (0.04)	0.160** (0.05)
(LEXP(-2))	-0.026 (0.02)	0.107 (0.21)	0.394 (0.36)	*Δ(LEXP(-2))*				*Δ(LEXP(-2))*	-0.046** (0.02)	0.033 (0.20)	0.108 (0.30)	*(LEXP(-2))*			
(LEXP(-3))	-0.003 (0.01)	0.032 (0.15)	-0.278 (0.26)	*Δ(LEXP(-3))*				*Δ(LEXP(-3))*	-0.001 (0.04)	-0.008 (0.19)	0.119 (0.30)	*(LEXP(-3))*			
(LEXP(-4))				*Δ(LEXP(-4))*				*Δ(LEXP(-4))*	-0.018 (0.01)	-0.630*** (0.16)	-0.357 (0.25)	*(LEXP(-4))*			
Δ(LIMP(-1))	-0.034*** (0.01)	-0.268** (0.10)	-0.524*** (0.17)	*(LIMP(-1))*	0.000 (0.0003)	0.010** (0.003)	1.008*** (0.003)	*(LIMP(-1))*	0.009 (0.01)	0.144 (0.16)	1.251*** (0.25)	*Δ(LIMP(-1))*	-0.014 (0.02)	-0.036 (0.09)	-0.448*** (0.11)
Δ(LIMP(-2))	0.004 (0.01)	-0.166 (0.11)	-0.391** (0.19)	*(LIMP(-2))*				*(LIMP(-2))*	0.011 (0.02)	-0.326 (0.23)	-0.835** (0.36)	*Δ(LIMP(-2))*			
Δ(LIMP(-3))	-0.034*** (0.01)	-0.014 (0.10)	-0.346** (0.17)	*(LIMP(-3))*				*(LIMP(-3))*	-0.002 (0.02)	0.225 (0.23)	0.371 (0.35)	*Δ(LIMP(-3))*			
Δ(LIMP(-4))				*(LIMP(-4))*				*(LIMP(-4))*	-0.008 (0.01)	0.008 (0.16)	0.241 (0.24)	*Δ(LIMP(-4))*			
C	0.070 (0.06)	1.795*** (0.57)	2.169 (0.96)	*C*				*C*	-0.013 (0.02)	-0.123 (0.25)	-0.081 (0.39)	*C*	-0.064 (0.08)	0.399 (0.38)	-1.269** (0.46)
D1	-0.003 (0.01)	-0.068 (0.10)	-0.009 (0.17)	*D1*	0.009 (0.01)	-0.038 (0.12)	0.141 (0.14)	*D1*	0.034** (0.01)	-0.012 (0.10)	-0.134 (0.16)	*D1*	-0.018 (0.01)	0.084 (0.07)	-0.276** (0.09)
D2	-0.005 (0.01)	0.402*** (0.09)	0.510*** (0.16)	*D2*	-0.009 (0.01)	0.059 (0.01)	0.043 (0.01)	*D2*	-0.002 (0.01)	0.015 (0.09)	0.020 (0.14)	*D2*	-0.013 (0.007)	0.029 (0.03)	0.064 (0.04)
D3	0.027** (0.01)	0.243** (0.10)	0.172 (0.17)	*D3*	-0.046** (0.01)	-0.127 (0.15)	-0.412 (0.17)	*D3*	0.003 (0.01)	-0.101 (0.10)	-0.255 (0.15)	*D3*	-0.009 (0.01)	0.043 (0.89)	-0.230 (0.05)
Multivariate residual diagnostics				***Multivariate residual diagnostics***				***Multivariate residual diagnostics***				***Multivariate residual diagnostics***			
Normality (Jarque-Bera Test)	0.70	0.99		Normality (Jarque-Bera Test)	36.22	0.00		Normality (Jarque-Bera Test)	1.82	0.93		Normality (Jarque-Bera Test)	5.22	0.51	
Lag 1 Autocorrelation (LM Test)	10.26	0.32		Lag 1 Autocorrelation (LM Test)	9.99	0.35		Lag 1 Autocorrelation (LM Test)	17.59	0.04		Lag 1 Autocorrelation (LM Test)	8.18	0.51	
Lag 2 Autocorrelation (LM test)	2.68	0.97		Lag 2 Autocorrelation (LM test)	12.57	0.18		Lag 2 Autocorrelation (LM test)	11.62	0.23		Lag 2 Autocorrelation (LM test)	9.91	0.35	
Lag 3 Autocorrelation (LM Test)	6.39	0.69		Lag 3 Autocorrelation (LM Test)				Lag 3 Autocorrelation (LM Test)	6.38	0.70		Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)	10.18	0.33		Lag 4 Autocorrelation (LM test)				Lag 4 Autocorrelation (LM test)	8.48	0.48		Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	142.14	0.15		White Heteroscedasticity Test	73.11	0.04		White Heteroscedasticity Test	174.47	0.23		White Heteroscedasticity Test	65.22	0.14	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 32 (Continued): Country wise Vector Autoregressive Estimates for MFIs

Hong Kong			
	Δ*(LWG)*	*(LEXP)*	Δ*(LIMP)*
Δ*(LWG(-1))*	0.467*** (0.14)	1.248* (0.66)	2.113*** (2.11)
Δ*(LWG(-2))*			
Δ*(LWG(-3))*			
Δ*(LWG(-4))*			
(LEXP(-1))	-0.077 (0.06)	0.013 (0.30)	0.217 (0.27)
(LEXP(-2))			
(LEXP(-3))			
(LEXP(-4))			
Δ*(LIMP(-1))*	-0.005 (0.07)	-0.204 (0.32)	-0.427 (0.29)
Δ*(LIMP(-2))*			
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C	0.006 (0.006)	0.132*** (0.03)	0.106*** (0.02)
D1	0.008 (0.007)	-0.007 (0.03)	0.018 (0.03)
D2	-0.007 (0.006)	-0.060** (0.02)	-0.052** (0.02)
D3			
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	7.17	0.30	
Lag 1 Autocorrelation (LM Test)	10.40	0.31	
Lag 2 Autocorrelation (LM test)	7.63	0.57	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	51.35	0.34	

Mexico			
	(LWG)	Δ*(LEXP)*	*(LIMP)*
(LWG(-1))	1.082*** (0.19)	0.916 (1.15)	5.121*** (1.12)
(LWG(-2))	-0.785** (0.28)	-1.514 (1.67)	-6.668*** (1.63)
(LWG(-3))	0.591* (0.33)	-0.056 (1.92)	3.840** (1.83)
(LWG(-4))	-0.237 (0.22)	0.248 (1.28)	-1.584 (1.24)
Δ*((LEXP(-1))*	0.063** (0.03)	-0.138 (0.18)	0.139 (0.17)
Δ*((LEXP(-2))*	-0.061* (0.03)	-0.225 (0.18)	0.110 (0.18)
Δ*((LEXP(-3))*	0.019 (0.03)	-0.151 (0.19)	0.010 (0.19)
Δ*((LEXP(-4))*	-0.016 (0.03)	-0.306 (0.18)	-0.292 (0.17)
Δ*(LIMP(-1))*	0.038 (0.03)	0.076 (0.21)	0.014 (0.20)
Δ*(LIMP(-2))*	-0.057 (0.03)	0.232 (0.20)	-0.297 (0.20)
Δ*(LIMP(-3))*	0.006 (0.22)	0.256* (0.14)	-0.026 (0.14)
Δ*(LIMP(-4))*	-0.056** (0.02)	0.337** (0.15)	0.147 (0.15)
C	0.261 (0.15)	0.345 (0.88)	-0.463 (0.86)
D1	-0.030* (0.01)	0.206** (0.09)	0.047 (0.09)
D2	-0.011 (0.01)	-0.121 (0.08)	0.028 (0.08)
D3	-0.029 (0.03)	-0.229 (0.21)	0.155 (0.20)
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	4.02	0.67	
Lag 1 Autocorrelation (LM Test)	13.29	0.14	
Lag 2 Autocorrelation (LM test)	19.68	0.02	
Lag 3 Autocorrelation (LM Test)	14.44	0.10	
Lag 4 Autocorrelation (LM test)	11.87	0.22	
White Heteroscedasticity Test	167.52	0.36	

Morocco			
	Δ*((LWG)*	*(LEXP)*	Δ*(LIMP)*
Δ*(LWG(-1))*	-0.157 (0.16)	0.052 (0.05)	1.526** (0.05)
Δ*(LWG(-2))*	-0.090 (0.17)	1.226** (0.61)	0.226 (0.62)
Δ*(LWG(-3))*			
Δ*(LWG(-4))*			
(LEXP(-1))	-0.071 (0.05)	0.741*** (0.18)	-0.007 (0.18)
(LEXP(-2))	0.072 (0.05)	0.270 (0.18)	0.016 (0.18)
(LEXP(-3))			
(LEXP(-4))			
Δ*(LIMP(-1))*	0.093 (0.05)	-0.313 (0.20)	-0.145 (0.20)
Δ*(LIMP(-2))*	-0.068 (0.04)	-0.415** (0.16)	-0.190 (0.16)
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C			
D1	-0.025 (0.01)	0.023 (0.06)	0.023 (0.06)
D2	0.006 (0.01)	0.099* (0.05)	0.017 (0.05)
D3	0.001 (0.01)	-0.023 (0.05)	-0.076 (0.05)
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	32.12	0.000	
Lag 1 Autocorrelation (LM Test)	12.06	0.20	
Lag 2 Autocorrelation (LM test)	3.48	0.94	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	67.68	0.96	

Pakistan			
	(LWG)	Δ*((LEXP)*	Δ*(LIMP)*
(LWG(-1))	0.534** (0.18)	0.613 (0.58)	2.023*** (0.63)
(LWG(-2))	-0.270 (0.02)	-0.638 (0.68)	-1.973** (0.74)
(LWG(-3))	0.286 (0.21)	0.908 (0.66)	-0.037 (0.72)
(LWG(-4))	0.308 (0.19)	-0.585 (0.61)	-0.769 (0.67)
Δ*((LEXP(-1))*	-0.126** (0.06)	-0.301 (0.18)	-0.107 (0.20)
Δ*((LEXP(-2))*	0.066 (0.05)	-0.202 (0.18)	-0.014 (0.20)
Δ*((LEXP(-3))*	-0.070 (0.05)	-0.049 (0.18)	-0.333 (0.19)
Δ*((LEXP(-4))*	0.044 (0.06)	0.058 (0.20)	0.362 (0.22)
Δ*(LIMP(-1))*	0.025 (0.05)	-0.228 (0.15)	-0.082 (0.17)
Δ*(LIMP(-2))*	-0.021 (0.04)	-0.343** (0.14)	-0.230 (0.16)
Δ*(LIMP(-3))*	0.007 (0.04)	-0.118 (0.15)	-0.254 (0.16)
Δ*(LIMP(-4))*	-0.038 (0.04)	-0.317** (0.15)	-0.258 (0.16)
C	0.020 (0.03)	0.059 (0.10)	0.259** (0.11)
D1	0.033 (0.02)	0.130** (0.06)	0.080 (0.06)
D2	-0.003 (0.01)	0.011 (0.04)	-0.010 (0.04)
D3	0.013 (0.01)	-0.040 (0.05)	-0.091 (0.05)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	1.48	0.96	
Lag 1 Autocorrelation (LM Test)	11.40	0.24	
Lag 2 Autocorrelation (LM test)	8.77	0.45	
Lag 3 Autocorrelation (LM Test)	8.43	0.49	
Lag 4 Autocorrelation (LM test)	11.70	0.23	
White Heteroscedasticity Test	162.39	0.47	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 32 (Continued): Country wise Vector Autoregressive Estimates for MFIs

Peru	Δ(LWG)	(LEXP)	(LIMP)
Δ(LWG(-1))	0.650*** (0.16)	1.173 (1.25)	4.199*** (0.94)
Δ(LWG(-2))	-0.612*** (0.18)	-0.651 (1.47)	-1.763 (1.11)
Δ(LWG(-3))	0.526** (0.20)	2.132 (1.60)	1.561 (1.21)
Δ(LWG(-4))	-0.285 (0.18)	-1.510 (1.41)	-1.581 (1.06)
(LEXP(-1))	0.057* (0.03)	0.449* (0.23)	0.123 (0.17)
(LEXP(-2))	0.037 (0.03)	0.439 (0.27)	0.131 (0.20)
(LEXP(-3))	-0.117*** (0.02)	0.113 (0.22)	0.043 (0.17)
(LEXP(-4))	0.078** (0.03)	-0.400 (0.24)	-0.104 (0.18)
(LIMP(-1))	-0.004 (0.03)	0.052 (0.25)	0.893*** (0.19)
(LIMP(-2))	-0.087* (0.04)	-0.152 (0.38)	-0.198 (0.29)
(LIMP(-3))	0.079 (0.05)	0.514 (0.42)	0.120 (0.32)
(LIMP(-4))	-0.036 (0.03)	0.011 (0.26)	0.006 (0.19)
C	-0.059 (0.06)	-0.162 (0.51)	-0.070 (0.39)
D1	-0.027 (0.04)	0.524 (0.33)	0.492** (0.25)
D2	0.020* (0.01)	-0.061 (0.08)	0.079 (0.06)
D3	-0.030 (0.03)	-0.366 (0.27)	-0.409** (0.20)
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	7.90	0.24	
Lag 1 Autocorrelation (LM Test)	12.10	0.20	
Lag 2 Autocorrelation (LM test)	15.50	0.07	
Lag 3 Autocorrelation (LM Test)	8.85	0.45	
Lag 4 Autocorrelation (LM test)	17.96	0.03	
White Heteroscedasticity Test	154.88	0.64	

Philippines	Δ (LWG)	Δ(LEXP)	Δ (LIMP)
Δ (LWG(-1))	0.098 (0.14)	2.973** (1.20)	2.467** (0.86)
Δ (LWG(-2))			
Δ (LWG(-3))			
Δ (LWG(-4))			
Δ((LEXP(-1))	0.002 (0.01)	-0.060 (0.15)	0.081 (0.11)
Δ((LEXP(-2))			
Δ((LEXP(-3))			
Δ((LEXP(-4))			
Δ(LIMP(-1))	-0.052* (0.02)	-0.288 (0.22)	-0.188 (0.16)
Δ(LIMP(-2))			
Δ(LIMP(-3))			
Δ(LIMP(-4))			
C	0.008** (0.003)	0.032 (0.02)	0.056** (0.02)
D1	-0.086 (0.01)	0.253** (0.12)	-0.050 (0.08)
D2	0.000 (0.009)	0.148** (0.07)	-0.005 (0.05)
D3	-0.004 (0.009)	0.051 (0.07)	0.107** (0.05)
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	9.72	0.13	
Lag 1 Autocorrelation (LM Test)	5.22	0.81	
Lag 2 Autocorrelation (LM test)	10.49	0.31	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	78.82	0.01	

South Africa	Δ (LWG)	Δ(LEXP)	(LIMP)
Δ(LWG(-1))	0.326** 0.13)	0.224 (1.14)	2.840** (1.22)
Δ(LWG(-2))			
Δ(LWG(-3))			
Δ(LWG(-4))			
Δ((LEXP(-1))	0.004 (0.01)	-0.071 (0.15)	-0.035 (0.16)
Δ((LEXP(-2))			
Δ((LEXP(-3))			
Δ((LEXP(-4))			
(LIMP(-1))	-0.017** (0.008)	-0.109 (0.06)	0.812*** (0.07)
(LIMP(-2))			
(LIMP(-3))			
(LIMP(-4))			
C	0.167** (0.08)	1.132 (0.68)	1.898** (0.72)
D1	0.011 (0.01)	0.095 (0.08)	0.058 (0.09)
D2	0.012 (0.01)	0.055 (0.10)	0.192 (0.11)
D3	-0.017 (0.01)	-0.075 (0.09)	-0.083 (0.09)
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	12.21	0.05	
Lag 1 Autocorrelation (LM Test)	4.58	0.86	
Lag 2 Autocorrelation (LM test)	7.35	0.60	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	51.08	0.58	

Turkey	Δ (LWG)	Δ((LEXP)	(LIMP)
Δ (LWG(-1))	-0.072 (0.14)	0.855 (0.53)	2.993*** (0.69)
Δ (LWG(-2))	0.097 (0.14)	-0.462 (0.52)	0.102 (0.69)
Δ (LWG(-3))	-0.151 (0.14)	-0.212 (0.52)	-0.646 (0.68)
Δ (LWG(-4))			
Δ((LEXP(-1))	0.004 (0.05)	-0.349* (0.19)	0.183 (0.25)
Δ((LEXP(-2))	0.081 (0.05)	0.024 (0.20)	0.504* (0.26)
Δ((LEXP(-3))	0.008 (0.05)	-0.051 (0.18)	-0.391 (0.24)
Δ((LEXP(-4))			
(LIMP(-1))	-0.028 (0.03)	0.226* (0.12)	0.593*** (0.15)
(LIMP(-2))	0.000 (0.03)	-0.184 (0.14)	-0.022 (0.18)
(LIMP(-3))	0.030 (0.03)	-0.033 (0.12)	0.440** (0.17)
(LIMP(-4))			
C	-0.093** (0.03)	-0.011 (0.12)	0.241 (0.16)
D1	-0.032 (0.02)	0.002 (0.09)	0.044 (0.12)
D2	-0.083** (0.02)	-0.033 (0.10)	0.018 (0.13)
D3			
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	10.60	0.10	
Lag 1 Autocorrelation (LM Test)	7.09	0.62	
Lag 2 Autocorrelation (LM test)	10.49	0.31	
Lag 3 Autocorrelation (LM Test)	11.67	0.23	
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	109.48	0.85	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 32 (Continued): Country wise Vector Autoregressive Estimates for MFIs

Venezuela			
	Δ *(LWG)*	Δ*(LEXP)*	*(LIMP)*
Δ*(LWG(-1))*	0.306* (0.15)	-0.038 (1.03)	4.010*** (0.80)
Δ*(LWG(-2))*	-0.147 (0.17)	-1.507 (1.15)	0.591 (0.89)
Δ*(LWG(-3))*			
Δ*(LWG(-4))*			
Δ *(LEXP(-1))*	0.025 (0.02)	-0.396** (0.17)	0.242* (0.13)
Δ *(LEXP(-2))*	0.020 (0.02)	-0.238 (0.17)	0.069 (0.13)
Δ *(LEXP(-3))*			
Δ *(LEXP(-4))*			
(LIMP(-1))	-0.053* (0.02)	0.084 (0.18)	0.491*** (0.14)
(LIMP(-2))	0.042 (0.02)	-0.214 (0.18)	0.401** (0.14)
(LIMP(-3))			
(LIMP(-4))			
C	0.107 (0.11)	1.326 (0.77)	1.093* (0.59)
D1	-0.019 (0.02)	-0.260 (0.17)	0.175 (0.13)
D2	0.017 (0.02)	0.170 (0.18)	-0.225 (0.14)
D3			
Multivariate residual diagnostics			
Normality (Jarque-Bera Test)	23.72	0.0006	
Lag 1 Autocorrelation (LM Test)	4.36	0.88	
Lag 2 Autocorrelation (LM test)	7.80	0.55	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	121.26	0.004	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 33: Country wise Vector Autoregressive Estimates for LFIs

Bangladesh			
	(LWG)	Δ *(LEXP)*	*(LIMP)*
(LWG(-1))	0.878*** (0.18)	1.003*** (0.31)	0.675 (0.40)
(LWG(-2))	-0.057 (0.33)	-1.606** (0.56)	-0.908 (0.72)
(LWG(-3))	-0.888 (0.39)	-0.236 (0.66)	-1.183 (0.85)
(LWG(-4))	0.942*** (0.27)	1.235** (0.46)	1.047 (0.60)
Δ *(LEXP(-1))*	-0.225** (0.11)	-0.450** (0.18)	-0.086 (0.24)
Δ *(LEXP(-2))*	0.210 (0.12)	0.157 (0.21)	0.696** (0.27)
Δ *(LEXP(-3))*	0.222** (0.10)	0.271 (0.18)	0.304 (0.23)
Δ *(LEXP(-4))*	0.201** (0.08)	0.120 (0.14)	0.025 (0.18)
Δ *(LIMP(-1))*	-0.065 (0.07)	-0.070 (0.12)	-0.479*** (0.15)
Δ *(LIMP(-2))*	-0.036 (0.08)	-0.015 (0.13)	-0.313* (0.17)
Δ *(LIMP(-3))*	0.072 (0.08)	0.182 (0.13)	-0.149 (0.17)
Δ *(LIMP(-4))*	0.032 (0.07)	0.152 (0.13)	-0.222 (0.16)
C	-0.040 (0.03)	0.042 (0.05)	0.039 (0.06)
D1	-0.216* (0.11)	-0.272 (0.19)	-0.580** (0.25)
D2	0.037 (0.06)	0.140 (0.11)	0.227 (0.14)
D3	0.224* (0.11)	0.655*** (0.20)	-0.653** (0.26)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	362.60	0.00	
Lag 1 Autocorrelation (LM Test)	9.37	0.40	
Lag 2 Autocorrelation (LM test)	9.09	0.42	
Lag 3 Autocorrelation (LM Test)	8.62	0.47	
Lag 4 Autocorrelation (LM test)	7.53	0.58	
White Heteroscedasticity Test	149.86	0.74	

Benin			
	Δ *(LWG)*	Δ*(LEXP)*	*(LIMP)*
Δ *(LWG(-1))*	-0.388** (0.15)	2.423 (2.52)	4.127** (1.74)
Δ *(LWG(-2))*	-0.252 (0.15)	-0.725 (0.28)	0.414 (1.78)
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ *(LEXP(-1))*	-0.007 (0.009)	0.189 (0.16)	-0.042 (0.11)
Δ *(LEXP(-2))*	0.012 (0.01)	-0.162 (0.16)	0.371*** (0.11)
Δ *(LEXP(-3))*			
Δ *(LEXP(-4))*			
(LIMP(-1))	0.004 (0.01)	-0.455** (0.22)	0.728*** (0.15)
(LIMP(-2))	-0.007 (0.01)	0.440** (0.21)	0.225 (0.14)
(LIMP(-3))			
(LIMP(-4))			
C	0.023 (0.02)	0.173 (0.37)	0.364 (0.26)
D1	-0.038** (0.01)	0.361 (0.22)	-0.113 (0.15)
D2	-0.020 (0.01)	-0.167 (0.23)	0.407** (0.16)
D3	0.007 (0.01)	-0.241 (0.20)	-0.042 (0.13)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	3.13	0.79	
Lag 1 Autocorrelation (LM Test)	15.33	0.08	
Lag 2 Autocorrelation (LM test)	15.24	0.08	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	118.05	0.02	

Burkina Faso			
	Δ *(LWG)*	Δ*(LEXP)*	*(LIMP)*
Δ*(LWG(-1))*	-0.546*** (0.15)	0.227 (0.75)	0.358 (0.83)
Δ*(LWG(-2))*	-0.082 (0.15)	1.971** (0.76)	1.580* (0.84)
Δ*(LWG(-3))*			
Δ*(LWG(-4))*			
Δ*((LEXP(-1))*	0.020 (0.03)	-0.049 (0.17)	-0.094 (0.19)
Δ*((LEXP(-2))*	0.046 (0.03)	-0.219 (0.17)	0.090 (0.19)
Δ*((LEXP(-3))*			
Δ*((LEXP(-4))*			
Δ *(LIMP(-1))*	-0.022 (0.03)	0.028 (0.17)	-0.212 (0.19)
Δ *(LIMP(-2))*	-0.060 (0.03)	0.038 (0.17)	-0.314 (0.19)
Δ *(LIMP(-3))*			
Δ *(LIMP(-4))*			
C	0.013 (0.009)	0.087* (0.04)	0.084 (0.05)
D1	-0.061 (0.05)	-0.206 (0.24)	-0.073 (0.27)
D2	0.059 (0.05)	0.236 (0.28)	0.343 (0.31)
D3	0.000 (0.03)	-0.214 (0.15)	-0.385** (0.16)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	64.46	0.00	
Lag 1 Autocorrelation (LM Test)	13.09	0.15	
Lag 2 Autocorrelation (LM test)	3.25	0.95	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	9.49	0.39	

Burundi			
	(LWG)	Δ*((LEXP)*	*(LIMP)*
(LWG(-1))	0.466*** (0.12)	-0.232 (0.50)	-0.249 (0.35)
(LWG(-2))			
(LWG(-3))			
(LWG(-4))			
Δ*((LEXP(-1))*	0.009 (0.03)	-0.503*** (0.13)	0.035 (0.09)
Δ*((LEXP(-2))*			
Δ*((LEXP(-3))*			
Δ*((LEXP(-4))*			
(LIMP(-1))	-0.018 (0.02)	0.022 (0.10)	0.996*** (0.07)
(LIMP(-2))			
(LIMP(-3))			
(LIMP(-4))			
C	0.739*** (0.20)	0.195 (0.22)	0.382 (0.59)
D1	0.103** (0.03)	-0.029 (0.14)	-0.040 (0.10)
D2	-0.002 (0.03)	-0.035 (0.13)	0.101 (0.09)
D3	0.000 (0.03)	0.024 (0.13)	-0.068 (0.09)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	367.92	0.00	
Lag 1 Autocorrelation (LM Test)	7.54	0.58	
Lag 2 Autocorrelation (LM test)	5.62	0.77	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	45.29	0.79	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 33 (Continued): Country wise Vector Autoregressive Estimates for LFIs

Cameroon	Δ*(LWG)*	*(LEXP)*	Δ *(LIMP)*
Δ*(LWG(-1))*	-0.001 (0.19)	-1.724 (2.26)	-0.662 (1.26)
Δ*(LWG(-2))*	-0.480** (0.17)	-0.444 (2.05)	0.436 (1.14)
Δ*(LWG(-3))*	-0.232 (0.17)	-0.180 (2.04)	0.302 (1.13)
Δ*(LWG(-4))*	-0.370** (0.17)	-1.561 (2.01)	-1.147 (1.12)
(LEXP(-1))	-0.002 (0.01)	0.394** (0.17)	0.112 (0.09)
(LEXP(-2))	-0.004 (0.01)	0.132 (0.19)	0.018 (0.11)
(LEXP(-3))	-0.011 (0.01)	0.027 (0.19)	-0.232 (0.10)
(LEXP(-4))	0.009 (0.01)	0.382** (0.16)	0.122 (0.09)
Δ *(LIMP(-1))*	0.004 (0.02)	0.277 (0.28)	-0.229 (0.16)
Δ *(LIMP(-2))*	0.027 (0.02)	0.273 (0.27)	-0.472*** (0.15)
Δ *(LIMP(-3))*	0.040* (0.02)	0.214 (0.25)	-0.071 (0.14)
Δ *(LIMP(-4))*	0.014 (0.02)	0.396 (0.28)	-0.376** (0.15)
C	0.074 (0.04)	0.490 (0.56)	0.038 (0.31)
D1	-0.042 (0.02)	0.311 (0.34)	-0.224 (0.19)
D2	-0.002 (0.01)	0.464*** (0.15)	-0.052 (0.08)
D3	-0.041 (0.02)	-0.323 (0.30)	-0.221 (0.17)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	16.59	0.01	
Lag 1 Autocorrelation (LM Test)	16.53	0.05	
Lag 2 Autocorrelation (LM test)	9.26	0.41	
Lag 3 Autocorrelation (LM Test)	13.78	0.13	
Lag 4 Autocorrelation (LM test)	13.45	0.14	
White Heteroscedasticity Test	171.74	0.28	

Costa Rica	Δ *(LWG)*	Δ*(LEXP)*	*(LIMP)*
Δ *(LWG(-1))*	-0.097 (0.14)	-0.056 (0.52)	1.814*** (0.59)
Δ *(LWG(-2))*	-0.356** (0.14)	0.430 (0.55)	0.481 (0.62)
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ*(LEXP(-1))*	0.014 (0.04)	-0.323** (0.15)	-0.067 (0.17)
Δ*(LEXP(-2))*	0.026 (0.03)	-0.146 (0.14)	-0.203 (0.15)
Δ*(LEXP(-3))*			
Δ*(LEXP(-4))*			
(LIMP(-1))	-0.036 (0.03)	0.047 (0.14)	0.646*** (0.16)
(LIMP(-2))	0.031 (0.03)	-0.104 (0.14)	0.312* (0.16)
(LIMP(-3))			
(LIMP(-4))			
C	0.047 (0.04)	0.560*** (0.15)	0.478** (0.16)
D1	- 0.093*** (0.01)	-0.060 (0.06)	-0.069 (0.07)
D2	-0.009 (0.01)	0.228*** (0.06)	0.170** (0.06)
D3	0.003 (0.01)	-0.082* (0.04)	-0.136** (0.05)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	0.57	0.99	
Lag 1 Autocorrelation (LM Test)	15.67	0.07	
Lag 2 Autocorrelation (LM test)	8.36	0.49	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	95.40	0.32	

Côte d'Ivoire	Δ *(LWG)*	*(LEXP)*	Δ*((LIMP)*
Δ*(LWG(-1))*	0.207 (0.17)	0.277 (0.39)	1.245** (0.61)
Δ*(LWG(-2))*	-0.007 (0.18)	0.409 (0.41)	0.393 (0.64)
Δ*(LWG(-3))*	0.095 (0.17)	-0.751* (0.40)	0.338 (0.63)
Δ*(LWG(-4))*	-0.236 (0.18)	0.981** (0.42)	-0.363 (0.66)
(LEXP(-1))	-0.050 (0.06)	0.982*** (0.15)	0.063 (0.23)
(LEXP(-2))	0.104 (0.09)	-0.001 (0.22)	0.583 (0.34)
(LEXP(-3))	-0.035 (0.08)	-0.361* (0.18)	-0.062 (0.29)
(LEXP(-4))	-0.017 (0.07)	0.396** (0.17)	-0.560** (0.26)
Δ *(LIMP(-1))*	-0.044 (0.04)	-0.123 (0.09)	-0.743*** (0.15)
Δ *(LIMP(-2))*	-0.063 (0.05)	-0.144 (0.12)	-0.719*** (0.19)
Δ *(LIMP(-3))*	-0.061 (0.05)	-0.027 (0.12)	-0.561*** (0.18)
Δ *(LIMP(-4))*	-0.070 (0.04)	-0.091 (0.09)	-0.042 (0.14)
C			
D1	-0.032 (0.02)	-0.115* (0.06)	-0.150 (0.10)
D2	-0.034 (0.03)	-0.112 (0.08)	-0.257** (0.12)
D3	-0.060 (0.04)	0.123 (0.10)	-0.433** (0.16)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	73.78	0.00	
Lag 1 Autocorrelation (LM Test)	7.33	0.60	
Lag 2 Autocorrelation (LM test)	15.94	0.06	
Lag 3 Autocorrelation (LM Test)	4.90	0.84	
Lag 4 Autocorrelation (LM test)	11.18	0.26	
White Heteroscedasticity Test	155.18	0.63	

Dominick Republic	Δ *(LWG)*	*(LEXP)*	*(LIMP)*
Δ *(LWG(-1))*	-0.222 (0.14)	0.881 (0.90)	2.029*** (0.60)
Δ *(LWG(-2))*			
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
(LEXP(-1))	0.010 (0.02)	0.173 (0.14)	0.129 (0.09)
(LEXP(-2))			
(LEXP(-3))			
(LEXP(-4))			
(LIMP(-1))	-0.026 (0.02)	0.525*** (0.12)	0.873*** (0.08)
(LIMP(-2))			
(LIMP(-3))			
(LIMP(-4))			
C	0.149 (0.16)	2.461** (1.01)	0.050 (0.67)
D1	-0.014 (0.2)	-0.008 (0.14)	0.154 (0.09)
D2	-0.012 (0.02)	-0.335* (0.17)	0.058 (0.11)
D3	0.017 (0.04)	-0.181 (0.29)	-0.692*** (0.19)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	447.91	0.00	
Lag 1 Autocorrelation (LM Test)	13.71	0.13	
Lag 2 Autocorrelation (LM test)	4.15	0.90	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	67.86	0.09	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 33 (Continued): Country wise Vector Autoregressive Estimates for LFIs

Ecuador			
	Δ *(LWG)*	Δ*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	-0.270* (0.14)	-0.552 (1.19)	4.376*** (0.91)
Δ *(LWG(-2))*			
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ*(LEXP(-1))*	0.078*** (0.02)	0.276 (0.17)	-0.098 (0.13)
Δ*(LEXP(-2))*			
Δ*(LEXP(-3))*			
Δ*(LEXP(-4))*			
Δ*(LIMP(-1))*	-0.055** (0.01)	-0.140 (0.16)	-0.110 (0.12)
Δ*(LIMP(-2))*			
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C	0.006 (0.003)	0.057 (0.03)	0.063 (0.02)
D1	-0.015 (0.01)	-0.100 (0.11)	0.033 (0.09)
D2	0.0002 (0.01)	0.077 (0.14)	0.067 (0.10)
D3	-0.067*** (0.02)	0.008 (0.18)	-0.138 (0.14)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	6.06	0.41	
Lag 1 Autocorrelation (LM Test)	13.37	0.14	
Lag 2 Autocorrelation (LM test)	9.78	0.36	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	57.12	0.35	

Gabon			
	Δ *(LWG)*	*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	-0.224 (0.15)	1.468 (1.47)	1.753** (0.64)
Δ *(LWG(-2))*	-0.073 (0.15)	-2.037 (1.49)	0.535 (0.64)
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
(LEXP(-1))	0.005 (0.01)	0.562*** (0.16)	0.077 (0.07)
(LEXP(-2))	0.0004 (0.01)	0.236 (0.15)	-0.079 (0.06)
(LEXP(-3))			
(LEXP(-4))			
Δ *(LIMP(-1))*	-0.017 (0.03)	0.443 (0.32)	-0.137 (0.14)
Δ*(LIMP(-2))*	-0.073** (0.03)	-0.070 (0.28)	-0.125 (0.12)
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C	-0.028 (0.09)	1.655* (0.87)	0.079 (0.38)
D1	-0.112** (0.04)	-0.119 (0.40)	-0.029 (0.17)
D2	0.031 (0.03)	0.270 (0.36)	0.443** (0.15)
D3	-0.019 (0.04)	-0.173 (0.44)	-0.040 (0.19)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	91.29	0.00	
Lag 1 Autocorrelation (LM Test)	14.68	0.10	
Lag 2 Autocorrelation (LM test)	8.69	0.46	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	99.96	0.22	

Ghana			
	(LWG)	Δ*(LEXP)*	Δ *(LIMP)*
(LWG(-1))	0.250 (0.14)	1.240 (1.93)	3.677** (1.71)
(LWG(-2))	-0.031 (0.15)	-0.499 (2.01)	-1.312 (1.78)
(LWG(-3))	0.427** (0.14)	-1.463 (1.91)	-2.662 (1.69)
(LWG(-4))			
Δ*(LEXP(-1))*	0.008 (0.01)	-0.117 (0.22)	0.043 (0.19)
Δ*(LEXP(-2))*	-0.016 (0.01)	0.053 (0.22)	0.517** (0.19)
Δ*(LEXP(-3))*	0.027 (0.01)	0.249 (0.24)	0.394* (0.21)
Δ*(LEXP(-4))*			
Δ *(LIMP(-1))*	-0.028 (0.01)	-0.212 (0.24)	-0.379 (0.21)
Δ *(LIMP(-2))*	0.003 (0.01)	-0.122 (0.21)	-0.388** (0.19)
Δ *(LIMP(-3))*	-0.004 (0.01)	-0.365 (0.23)	-0.259 (0.20)
Δ *(LIMP(-4))*			
C	0.311** (0.12)	0.737 (1.71)	0.369 (1.52)
D1	0.017 (0.02)	-0.297 (0.27)	-0.135 (0.24)
D2	0.037 (0.03)	0.148 (0.44)	0.079 (0.39)
D3	-0.037 (0.02)	-0.317 (0.36)	-0.253 (0.31)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	163.06	0.00	
Lag 1 Autocorrelation (LM Test)	5.73	0.76	
Lag 2 Autocorrelation (LM test)	5.53	0.78	
Lag 3 Autocorrelation (LM Test)	7.46	0.58	
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	97.62	0.97	

Honduras			
	Δ *(LWG)*	Δ(*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	0.189 (0.14)	1.574 (1.29)	2.668*** (0.63)
Δ *(LWG(-2))*			
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ*(LEXP(-1))*	0.027 (0.01)	-0.337* (0.17)	-0.037 (0.08)
Δ*(LEXP(-2))*			
Δ*(LEXP(-3))*			
Δ*(LEXP(-4))*			
Δ*(LIMP(-1))*	- 0.094*** (0.03)	0.270 (0.28)	-0.112 (0.14)
Δ*(LIMP(-2))*			
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C	0.002 (0.004)	0.075 (0.04)	0.102*** (0.02)
D1	-0.035** (0.01)	-0.036 (0.14)	-0.082 (0.07)
D2	0.022 (0.01)	-0.215* (0.12)	-0.147** (0.05)
D3	0.001 (0.02)	-0.042 (0.20)	-0.153 (0.09)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	17.91	0.006	
Lag 1 Autocorrelation (LM Test)	9.02	0.43	
Lag 2 Autocorrelation (LM test)	7.12	0.62	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	62.56	0.19	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 33 (Continued): Country wise Vector Autoregressive Estimates LFIs

Jamaica	Δ *(LWG)*	Δ*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	0.268 (0.15)	-0.592 (0.96)	0.484 (0.77)
Δ *(LWG(-2))*	-0.172 (0.16)	1.340 (0.99)	1.502* (0.79)
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ*(LEXP(-1))*	0.0003 (0.02)	-0.007 (0.18)	0.467** (0.14)
Δ*(LEXP(-2))*	-0.022 (0.03)	-0.216 (0.20)	0.055 (0.16)
Δ*(LEXP(-3))*			
Δ*(LEXP(-4))*			
Δ*(LIMP(-1))*	-0.037 (0.03)	-0.208 (0.23)	-0.483** (0.19)
Δ*(LIMP(-2))*	0.008 (0.03)	-0.396* (0.21)	-0.145 (0.17)
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C	-0.001 (0.004)	0.029 (0.02)	0.074*** (0.02)
D1	0.025* (0.01)	0.081 (0.08)	-0.087 (0.07)
D2	-0.028 (0.01)	0.251** (0.11)	0.151 (0.08)
D3	-0.043** (0.01)	-0.096 (0.09)	-0.095 (0.07)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	25.78	0.0002	
Lag 1 Autocorrelation (LM Test)	11.52	0.24	
Lag 2 Autocorrelation (LM test)	4.01	0.91	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	83.38	0.67	

Kenya	Δ *(LWG)*	Δ*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	0.200 (0.14)	0.077 (1.00)	2.428** (1.10)
Δ *(LWG(-2))*			
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ*(LEXP(-1))*	0.018 (0.02)	-0.133 (0.15)	0.378** (0.16)
Δ*(LEXP(-2))*			
Δ*(LEXP(-3))*			
Δ*(LEXP(-4))*			
Δ*(LIMP(-1))*	-0.041** (0.01)	-0.321 (0.13)	-0.542*** (0.14)
Δ*(LIMP(-2))*			
Δ*(LIMP(-3))*			
Δ*(LIMP(-4))*			
C	0.005 (0.003)	0.071 (0.02)	0.073** (0.2)
D1	-0.020 (0.01)	0.089 (0.08)	-0.003 (0.09)
D2	0.003 (0.01)	-0.224** (0.08)	-0.084 (0.09)
D3	-0.030** (0.01)	-0.125 (0.07)	-0.212** (0.08)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	3.06	0.80	
Lag 1 Autocorrelation (LM Test)	11.35	0.25	
Lag 2 Autocorrelation (LM test)	10.13	0.33	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	56.60	0.37	

Mauritius	Δ *(LWG)*	Δ*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	-0.241 (0.17)	-0.754 (0.85)	-1.072 (1.21)
Δ *(LWG(-2))*	0.224 (0.13)	-0.123 (0.65)	0.384 (0.93)
Δ *(LWG(-3))*	-0.145 (0.17)	1.179 (0.86)	1.944 (1.22)
Δ *(LWG(-4))*	-0.014 (0.16)	1.081 (0.80)	0.539 (1.14)
Δ*(LEXP(-1))*	-0.116*** (0.03)	-0.346** (0.169)	-0.025 (0.23)
Δ*(LEXP(-2))*	-0.074* (0.03)	-0.541** (0.18)	0.048 (0.26)
Δ*(LEXP(-3))*	-0.014 (0.03)	-0.358** (0.15)	-0.143 (0.22)
Δ*(LEXP(-4))*	-0.016 (0.02)	-0.617*** (0.13)	-0.162 (0.19)
Δ*(LIMP(-1))*	0.138*** (0.02)	-0.065 (0.14)	-0.520** (0.20)
Δ*(LIMP(-2))*	0.103** (0.03)	0.522** (0.17)	-0.096 (0.25)
Δ*(LIMP(-3))*	0.047 (0.03)	0.481** (0.18)	0.399 (0.26)
Δ*(LIMP(-4))*	0.027 (0.03)	0.573*** (0.16)	0.305 (0.22)
C	-0.003 (0.006)	-0.020 (0.03)	0.044 (0.04)
D1	-0.061*** (0.01)	-0.056 (0.08)	-0.175 (0.12)
D2	0.066** (0.02)	0.369 (0.13)	0.068 (0.18)
D3	-0.049 (0.03)	0.130 (0.17)	0.367 (0.25)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	34.30	0.00	
Lag 1 Autocorrelation (LM Test)	8.50	0.48	
Lag 2 Autocorrelation (LM test)	19.49	0.02	
Lag 3 Autocorrelation (LM Test)	15.62	0.07	
Lag 4 Autocorrelation (LM test)	12.70	0.17	
White Heteroscedasticity Test	194.51	0.04	

Niger	Δ *(LWG)*	Δ*(LEXP)*	Δ *(LIMP)*
Δ *(LWG(-1))*	-0.146 (0.16)	2.639 (1.59)	-0.055 (0.98)
Δ *(LWG(-2))*	-0.190 (0.15)	-2.231 (1.53)	2.762** (0.94)
Δ *(LWG(-3))*			
Δ *(LWG(-4))*			
Δ*(LEXP(-1))*	0.024 (0.01)	-0.076 (0.16)	0.030 (0.10)
Δ*(LEXP(-2))*	0.001 (0.01)	-0.065 (0.16)	0.149 (0.10)
Δ*(LEXP(-3))*			
Δ*(LEXP(-4))*			
Δ*(LIMP(-1))*	0.025 (0.02)	-0.309 (0.25)	-0.206 (0.15)
Δ*(LIMP(-2))*	0.025 (0.02)	0.034 (0.22)	-0.124 (0.14)
Δ*(LIMP(-3))*			
(LIMP(-4))			
C	-0.005 (0.005)	0.053 (0.04)	0.086** (0.03)
D1	-0.007 (0.04)	-0.609 (0.39)	-0.391 (0.24)
D2	0.032 (0.03)	-0.190 (0.36)	0.335 (0.22)
D3	-0.083 (0.05)	0.466 (0.53)	-0.292 (0.32)
Multivariate residual diagnostics	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	35.20	0.00	
Lag 1 Autocorrelation (LM Test)	4.05	0.90	
Lag 2 Autocorrelation (LM test)	8.48	0.48	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	81.91	0.71	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 33 (Continued): Country wise Vector Autoregressive Estimates for LFIs

Nigeria				*Panama*				*Senegal*				*Syria*			
	(LWG)	*(LEXP)*	*(LIMP)*		*(LWG)*	*(LEXP)*	*(LIMP)*		Δ *(LWG)*	*(LEXP)*	Δ*(LIMP)*		*(LWG)*	*((LEXP)*	Δ *(LIMP)*
(LWG(-1))	0.799*** (0.17)	0.796 (0.77)	1.444** (0.57)	*(LWG(-1))*	0.397* (0.21)	-0.149 (1.26)	-0.977 (0.66)	Δ*(LWG(-1))*	0.041 (0.15)	1.565 (1.01)	-0.440 (0.99)	*(LWG(-1))*	-0.268** (0.12)	-0.279 (0.61)	-0.063 (0.44)
(LWG(-2))	-0.441** (0.21)	-1.061 (0.96)	-1.188 (0.71)	*(LWG(-2))*	-0.093 (0.25)	-0.413 (1.52)	0.195 (0.80)	Δ*(LWG(-2))*	-0.152 (0.11)	-0.862 (0.78)	0.116 (0.77)	*(LWG(-2))*			
(LWG(-3))	0.260 (0.23)	0.110 (1.03)	0.016 (0.76)	*(LWG(-3))*	0.111 (0.26)	0.116 (1.54)	0.344 (0.82)	Δ*(LWG(-3))*				*(LWG(-3))*			
(LWG(-4))	0.024 (0.20)	-0.077 (0.89)	-0.669 (0.66)	*(LWG(-4))*	0.102 (0.15)	0.236 (0.94)	-0.019 (0.50)	Δ*(LWG(-4))*				*(LWG(-4))*			
Δ*(LEXP(-1))*	-0.093** (0.04)	-0.527** (0.19)	0.092 (0.14)	*(LEXP(-1))*	-0.095 (0.06)	-0.705* (0.38)	-0.634*** (0.20)	*(LEXP(-1))*	-0.068** (0.02)	0.534*** (0.16)	-0.125 (0.15)	*(LEXP(-1))*	-0.019 (0.01)	0.809*** (0.08)	-0.137** (0.06)
Δ*(LEXP(-2))*	-0.008 (0.05)	-0.599** (0.22)	0.052 (0.16)	*(LEXP(-2))*	-0.086 (0.06)	0.199 (0.38)	-0.007 (0.20)	*(LEXP(-2))*	0.069** (0.02)	0.472** (0.16)	0.133 (0.15)	*(LEXP(-2))*			
Δ*(LEXP(-3))*	0.038 (0.04)	-0.549** (0.21)	-0.089 (0.15)	*(LEXP(-3))*	0.073 (0.07)	0.619 (0.42)	0.363 (0.22)	*(LEXP(-3))*				*(LEXP(-3))*			
Δ*(LEXP(-4))*	-0.123** (0.04)	-0.624** (0.21)	-0.115 (0.15)	*(LEXP(-4))*	0.114 (0.07)	0.291 (0.45)	0.500** (0.24)	*(LEXP(-4))*				*(LEXP(-4))*			
Δ*(LIMP(-1))*	0.071 (0.06)	0.564* (0.30)	0.060 (0.22)	*(LIMP(-1))*	0.224 (0.13)	0.967 (0.79)	1.346*** (0.42)	Δ *(LIMP(-1))*	-0.002 (0.02)	-0.158 (0.17)	-0.178 (0.17)	Δ *(LIMP(-1))*	0.099 (0.04)	-0.313 (0.19)	-0.101 (0.14)
Δ*(LIMP(-2))*	-0.003 (0.07)	0.621** (0.31)	0.105 (0.23)	*(LIMP(-2))*	0.175 (0.15)	0.371 (0.91)	0.314 (0.48)	Δ *(LIMP(-2))*	0.004 (0.02)	0.107 (0.15)	-0.139 (0.15)	Δ*(LIMP(-2))*			
Δ*(LIMP(-3))*	0.019 (0.06)	0.671** (0.27)	-0.023 (0.20)	*(LIMP(-3))*	-0.198 (0.14)	-0.609 (0.86)	-0.310 (0.45)	Δ *(LIMP(-3))*				Δ *(LIMP(-3))*			
Δ*(LIMP(-4))*	0.105* (0.05)	0.452* (0.25)	0.085 (0.18)	*(LIMP(-4))*	-0.238 (0.15)	-0.374 (0.90)	-0.713 (0.47)	Δ *(LIMP(-4))*				Δ *(LIMP(-4))*			
C	0.190** (0.09)	0.317 (0.40)	0.267 (0.29)	*C*	0.689*** (0.20)	1.313 (1.21)	1.900** (0.64)	*C*				*C*	0.194 (0.15)	1.742** (0.76)	1.300** (0.55)
D1	0.011 (0.11)	-0.765 (0.51)	0.075 (0.38)	*D1*	-0.110 (0.06)	0.135 (0.39)	-0.088 (0.21)	*D1*	-0.013 (0.01)	-0.043 (0.07)	-0.086 (0.07)	*D1*	0.037 (0.04)	-0.391* (0.21)	-0.293* (0.15)
D2	-0.016 (0.08)	-0.426 (0.39)	-0.187 (0.28)	*D2*	0.085 (0.12)	1.452** (0.72)	0.298 (0.38)	*D2*	-0.012 (0.01)	-0.161 (0.11)	-0.297** (0.10)	*D2*	-0.063 (0.07)	0.365 (0.35)	0.061 (0.25)
D3	-0.055 (0.08)	-0.181 (0.36)	-0.234 (0.26)	*D3*	-0.030 (0.09)	-0.249 (0.57)	0.191 (0.62)	*D3*	-0.013 (0.01)	0.072 (0.12)	0.224* (0.12)	*D3*	-0.048 (0.05)	-0.459 (0.27)	-0.326 (0.20)
Multivariate residual diagnostics				***Multivariate residual diagnostics***				***Multivariate residual diagnostics***				***Multivariate residual diagnostics***	**Test Statistics**	**P-Value**	
Normality (Jarque-Bera Test)	59.04	0.00		Normality (Jarque-Bera Test)	141.10	0.00		Normality (Jarque-Bera Test)	76.62	0.00		Normality (Jarque-Bera Test)	4.26	0.64	
Lag 1 Autocorrelation (LM Test)	6.38	0.70		Lag 1 Autocorrelation (LM Test)	27.55	0.001		Lag 1 Autocorrelation (LM Test)	11.80	0.22		Lag 1 Autocorrelation (LM Test)	5.63	0.77	
Lag 2 Autocorrelation (LM test)	11.74	0.22		Lag 2 Autocorrelation (LM test)	5.95	0.74		Lag 2 Autocorrelation (LM test)	3.22	0.95		Lag 2 Autocorrelation (LM test)	10.75	0.29	
Lag 3 Autocorrelation (LM Test)	6.44	0.69		Lag 3 Autocorrelation (LM Test)	8.67	0.46		Lag 3 Autocorrelation (LM Test)				Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)	8.26	0.50		Lag 4 Autocorrelation (LM test)	2.11	0.98		Lag 4 Autocorrelation (LM test)				Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	142.74	0.85		White Heteroscedasticity Test	184.24	0.11		White Heteroscedasticity Test	66.08	0.97		White Heteroscedasticity Test	55.23	0.42	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.

Appendix 33 (Continued): Country wise Vector Autoregressive Estimates for LFIs

Togo			
	Δ(LWG)	*(LEXP)*	*(LIMP)*
Δ(LWG(-1))	-0.120 (0.16)	0.186 (0.65)	0.422 (0.77)
Δ(LWG(-2))	-0.152 (0.16)	1.031 (0.64)	1.516* (0.76)
Δ(LWG(-3))			
Δ(LWG(-4))			
(LEXP(-1))	-0.021 (0.05)	0.623** (0.22)	0.443 (0.26)
(LEXP(-2))	-0.019 (0.05)	-0.040 (0.21)	-0.089 (0.25)
(LEXP(-3))			
(LEXP(-4))			
(LIMP(-1))	0.018 (0.05)	-0.366* (0.19)	0.238 (0.23)
(LIMP(-2))	0.006 (0.04)	0.490** (0.17)	0.372* (0.21)
(LIMP(-3))			
(LIMP(-4))			
C	0.066 (0.17)	1.721** (0.69)	0.483 (0.82)
D1	0.009 (0.04)	0.005 (0.17)	0.093 (0.20)
D2	0.001 (0.04)	-0.088 (0.15)	-0.186 (0.18)
D3	-0.013 (0.05)	0.156 (0.21)	0.491** (0.24)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	1347.45	0.00	
Lag 1 Autocorrelation (LM Test)	11.28	0.25	
Lag 2 Autocorrelation (LM test)	10.96	0.27	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	60.53	0.99	

Tunisia			
	Δ (LWG)	*(LEXP)*	*Δ (LIMP)*
Δ(LWG(-1))	0.027 (0.36)	0.905 (1.22)	0.946 (1.18)
Δ(LWG(-2))	0.372 (0.34)	0.901 (1.15)	0.670 (1.11)
Δ(LWG(-3))			
Δ(LWG(-4))			
(LEXP(-1))	0.039 (0.06)	0.615** (0.21)	0.009 (0.20)
(LEXP(-2))	-0.039 (0.06)	0.397* (0.21)	0.001 (0.20)
(LEXP(-3))			
(LEXP(-4))			
Δ (LIMP(-1))	0.038 (0.07)	-0.107 (0.24)	-0.205 (0.23)
Δ (LIMP(-2))	-0.063 (0.06)	0.079 (0.20)	0.015 (0.19)
Δ (LIMP(-3))			
Δ (LIMP(-4))			
C			
D1	0.010 (0.05)	0.117 (0.17)	-0.018 (0.17)
D2	-0.013 (0.04)	-0.227 (0.15)	-0.038 (0.15)
D3	-0.012 (0.03)	-0.018 (0.10)	-0.072 (0.15)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	746.00	0.00	
Lag 1 Autocorrelation (LM Test)	8.78	0.45	
Lag 2 Autocorrelation (LM test)	14.25	0.11	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	111.90	0.05	

Uruguay			
	(LWG)	*(LEXP)*	*Δ (LIMP)*
(LWG(-1))	1.175*** (0.18)	1.320 (0.77)	3.236** (1.24)
(LWG(-2))	-0.563*** (0.15)	-2.168*** (0.67)	-3.630*** (1.09)
(LWG(-3))			
(LWG(-4))			
(LEXP(-1))	-0.010 (0.03)	0.813*** (0.14)	0.170 (0.23)
(LEXP(-2))	0.011 (0.03)	0.194 (0.14)	-0.145 (0.23)
(LEXP(-3))			
(LEXP(-4))			
Δ (LIMP(-1))	0.005 (0.02)	-0.111 (0.10)	-0.231 (0.17)
Δ (LIMP(-2))	-0.009 (0.02)	0.117 (0.09)	-0.008 (0.15)
Δ (LIMP(-3))			
Δ (LIMP(-4))			
C	0.314** (0.11)	0.680 (0.47)	0.185 (0.76)
D1	-0.045** (0.02)	-0.112 (0.08)	-0.045 (0.13)
D2	0.020 (0.01)	0.079 (0.05)	0.025 (0.09)
D3	0.012 (0.47)	0.185* (0.10)	-0.032 (0.16)
Multivariate residual diagnostics	**Test Statistics**		
Normality (Jarque-Bera Test)	24.96	0.0003	
Lag 1 Autocorrelation (LM Test)	11.07	0.27	
Lag 2 Autocorrelation (LM test)	4.22	0.89	
Lag 3 Autocorrelation (LM Test)			
Lag 4 Autocorrelation (LM test)			
White Heteroscedasticity Test	107.38	0.10	

Note: Standard error in parenthesis; *, ** and *** denote rejection of the null at 10%, 5% and 1% levels of significance respectively.